VARIATION IN THE ENERGY CONTENT OF PEAT

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VARIATION IN THE ENERGY CONTENT OF PEAT

by

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B.Sc. University of New Brunswick, 1974

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.....

Dean of Graduate Studies and Research

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ABSTRACT

Peat exhibits many properties which can be related to its botanical origin and degree of humification. The objective of the present study is to document the rate at which changes in the energy content of peat occur in relation to changes in peat type and degree of humification.

In conjunction with a detailed inventory of the peatlands of New Brunswick, 892 samples from 113 representative sites on 94 peatlands were collected between 1977 and 1981. The top-to-bottom sample core recovered at each site was divided into sections corresponding to changes in peat type or degree of humification. Moisture-free gross calorific value and ash content were determined and ash-free calorific value was calculated for each sample. Dry density was determined on samples collected in 1980 and 1981.

When gross and ash-free calorific value were plotted against humification considerable scatter of values was observed. Exclusion of high ash samples resulted in reduced scatter and further calculations used only samples with less than 15 percent ash. The data file was then subdivided into sphagnum peats and sedge peats. The calorific value of sphagnum peats increased with humification and had a coefficient of correlation of r=0.6269, whereas for sedge peats the coefficient of correlation was r=0.2627. Samples comprising both of these major peat groups had intermediate

characteristics. Subdivision of the major peat groups showed that minor botanical constituents such as shrubs and wood had limited effects on the relationships.

Ash content was found to be higher in sedge peats than in sphagnum peats, but the correlation with humification was very low. Peats containing wood or composed entirely of Carex were observed to have generally higher ash contents. Since these peat types commonly occur in swamp or marsh environments, the high ash contents are interpreted to be the result of deposition of mineral sediments during peat formation.

When dry density values were used to express the calorific values on a volumetric basis, the trends previously indicated on a weight basis were amplified.

The results demonstrated that the calorific value of peat increased with increased degree of humification and that the peat type influenced the rate of increase. Calculations using typical inventory data showed a 40 percent difference in potential energy yield between two deposits of equivalent volume. The results permit a quantitative comparison of the relative merits of the use of peats with low energy contents and short transportation distances to peats with higher energy contents and long transportation distances.

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INTRODUCTION

Peat Resources and Their Utilization

Peat is an accumulation of organic residues under anaerobic conditions. The rate of accumulation is 1 to 2 mm per year so for practical applications peat must be considered a nonrenewable resource. A peat-forming environment is termed a wetland, or biological peatland, while an accumulation of 30 cm of peat in such an environment is a peatland in the geological sense. The Wetlands Working Group of the Canada Committee on Ecological Land Classification recognizes numerous subdivisions of the following major classes of wetlands: bog, fen, swamp, marsh, and shallow open water (Zoltai, et al. 1975). In North America, muskeg is a term frequently employed for peatland, whereas in Europe mire is a common synonym.

For centuries peat has been used as a source of energy. Traditionally, blocks of peat were cut with a spade and stacked to dry, then burnt in an open hearth. While the traditional methods are still practised in some countries, most present-day methods of peat combustion are more complex. Large peat-burning stations can produce several hundred megawatts of thermal energy which is used for generation of electricity or district heating of population centres.

The U.S.S.R., Finland and Ireland are the largest users of fuel peat for energy production.

Kivinen and Pakarinen (1980) have recently estimated the extent of world peatlands to be 421 million hectares and anticipate this figure will increase to 500 million hectares when information on tropical and subtropical peatlands becomes available. Zoltai (1980) estimates there are 170 million hectares (18% of the land surface) of peatland in Canada. Table 1 lists the countries with the largest known extent of peatland and summarizes current peat production statistics. Kivinen (1980) provides a summary of the utilization of peatlands for agriculture and forestry.

The statistics in Table 1 indicate a low rate of utilization of the Canadian resource. In general, there have been only limited assessments of the extent and quality of the resource and hence its development potential. However, several provinces have recently initiated inventory programs. In New Brunswick an expanding horticultural peat industry, combined with an interest in the use of peat as a fuel, provided the impetus for the Department of Natural Resources to carry out detailed assessment of the Province's peatlands. Over 20,000 sites on 817 peatlands were investigated for peat depth and quality. The 140,000 hectares of peatlands in the Province (Figure 1) account for about 0.1 percent of Canada's total. The total volume of peat is about 2.4 billion cubic metres. The inventory program included the collection and analysis of samples from representative sites on major peatlands.

Country	Peatland (>30 cm) ha X 10^6	Annual Production tonnes X 10^3 @ 40% moisture	
		Fuel Peat	Horticultural Peat
Canada	170	-	488
USSR	150	80,000	120,000
USA	40	-	800
Indonesia	26	-	-
Finland	10.4	3,100	500
Sweden	7.0	-	270
China	3.5	800	1,300
Norway	3.0	1	83
Malaysia	2.4	-	-
U.K.	1.6	50	500
Poland	1.4	-	280
Ireland	1.2	5,570	380
FRG	1.1	250	2,000
TOTAL	417.2	89,771	126,601
ESTIMATED WORLD TOTAL	421	90,000	130,000

Table 1. The extent of peatland and annual peat production for various countries (after Kivinen and Pakarinen, 1980; Kivinen, 1980).

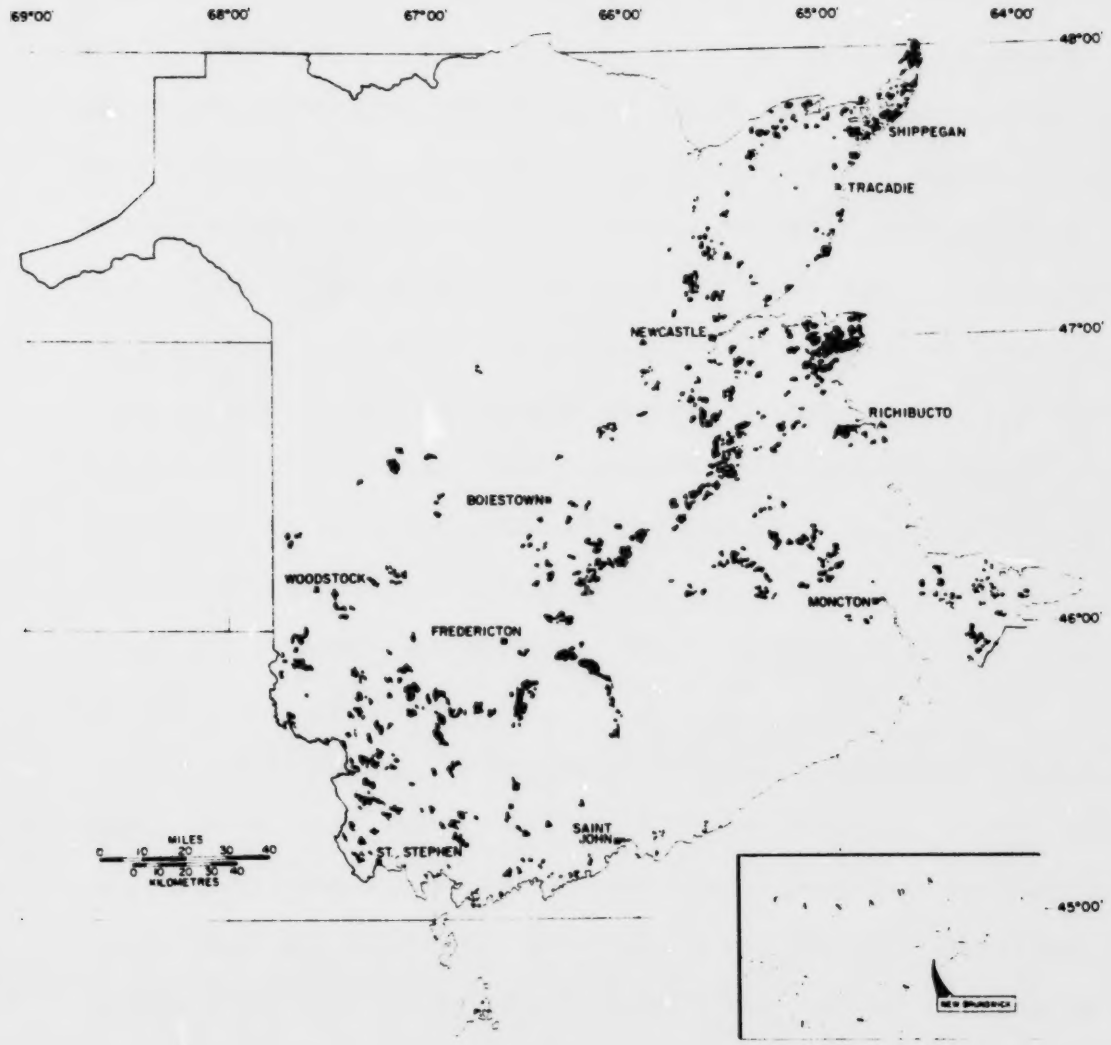

Figure 1. Distribution of peatlands in New Brunswick. (after Keys and Henderson, in press).

Energy Yields From Peat

Peat has a low unit energy content relative to conventional fossil fuels and consequently is not suited to long distance transport. Most peat combustion facilities have been in proximity to a supply of peat, but increased size has resulted in several hundred hectares of peat mining fields being required to provide the annual supply. Thus, the distance between the peat mining operations and the user have increased and transportation distances of 100 km have become common. This situation has been accentuated in many European countries by the depletion of peat reserves near major population centres, i.e. large users of energy. A similar situation exists in North America, in that the major peat reserves are in areas of low population density.

In addition to its low unit energy yield, peat has an inherent capacity to retain moisture. The effective energy yield increases as moisture content decreases. Conventional mining techniques rely on the sun and wind to achieve low moisture contents but methods of thermal and mechanical dewatering, beneficiation and conversion have been the subject of recent research (see review in Monenco Ontario Limited, 1981). While moisture reduction has received strong emphasis, little consideration has been given to inherent properties of the peat which may influence the energy yield. In some cases peat has been regarded as a homogeneous substance rather than a material that exhibits substantial differences in peat type (botanical composition) and degree

of humification (state of decomposition).

These differences in peat type and degree of humification are a function of the environment of deposition of the peat. For example, sphagnum peats normally are the major component of the accumulations in a bog environment, whereas woody peats and sedge peats are more common in swamp and marsh environments. The process of decomposition occurs at a much higher rate above the water table where aerobic bacteria are active than in the anaerobic zone beneath the water level. Since the magnitude of water level fluctuations is greatest in swamps and marshes, the process of decomposition would have a larger impact in these environments. However, this does not necessarily imply that peats occurring in such environments would be in a higher state of decomposition (i.e. have a high degree of humification). The complex interactions between these factors are discussed in more detail in Appendix V.

Traditionally, deposits containing mainly well humified peat have been used for fuel peat mining, while those containing poorly humified peat were regarded as having a lower energy content. However, only a few publications address the amount by which energy content is influenced by degree of humification and peat type.

Investigations by Salmi (1947, 1949, 1954, 1961) in Finland show that calorific value increases with humification and is influenced by peat type and ash content. His 300 samples were grouped into seven peat types and 10 degrees of

humification. Group means of ash-free and gross calorific value were reported, but the ranges observed were not. Makila (1980) produced graphs of effective heat content against humification of four peat type groupings from the Toholampi area of Finland. He reported a coefficient of correlation (r) of calorific value to humification of 0.508 for all samples with a higher correlation in sphagnum peats (r=0.685) than sedge peats (r=0.220). The ash-free calorific value of 64 samples from Newfoundland (Tibbetts, 1976) showed a 17 percent increase when plotted against humification (Montreal Engineering, 1978). The correlation between heat content and decomposition, as measured by electron paramagnetic resonance (EPR), showed a strong positive relationship (r=0.926) in a study by Pohjola, et al. (1980). Moisture content has also been used to predict energy content (Tolonen, et al. 1982). A subset of the data presented here has been published recently (Keys, 1983).

The objective of the present study is to document the rate at which the unit energy content (calorific value) of peat varies in relation to changes in the botanical composition and degree of humification. Such a relationship, combined with a knowledge of the types of peat in a deposit, would be valuable for the selection of new peat mining areas and assessment of the economics of development of deposits containing peats with low energy yields but with short transportation distances versus deposits with higher energy yields and longer transportation distances.

METHODOLOGY

Site Selection

Representative sites on peatlands with potential for fuel peat utilization were selected using the information compiled by the peatland inventory program of the Mineral Development Branch of the New Brunswick Department of Natural Resources (Keys and Henderson, in press). Cross-sections displaying the distribution of peat type and degrees of humification, peat isopach maps and field data sheets were used in the selection. Two types of representative sites were selected: (i) those with low potential for fuel peat mining, and (ii) those with higher potential for fuel peat. The present study deals only with the latter type. Determination of the type of sample to be collected was based on the traditionally accepted premise that sites with predominantly well decomposed peat had the best potential for fuel purposes. The grid lines placed during the initial inventory phase were used for site identification and location.

Sampling Procedure

At the selected sites a sample core of the complete peat depth was recovered. Prior to 1980, samples were collected using a 4 cm diameter piston sampler (described in Tolonen, 1968) which recovers a sample up to 80 cm long (Figures 2a, c, d). Dry density determinations were attempted on samples collected in 1979, but the results

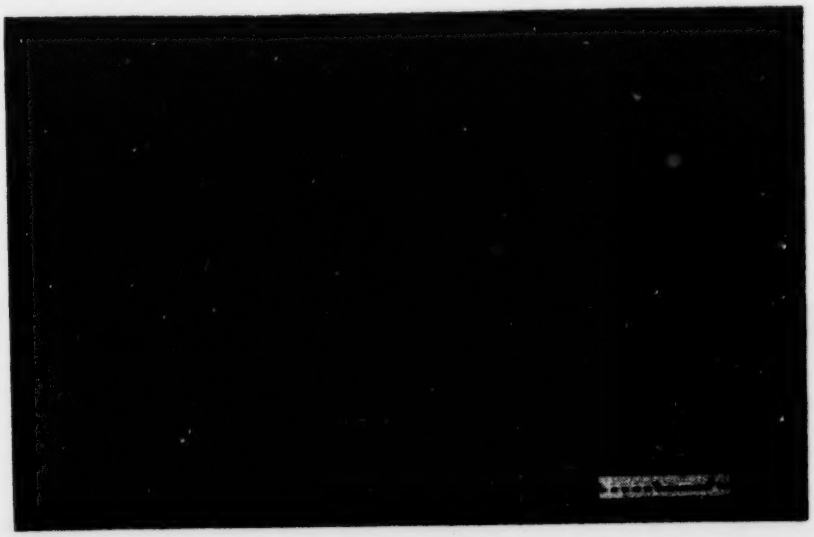

Figure 2a. The 4 cm piston sampler with accessories.

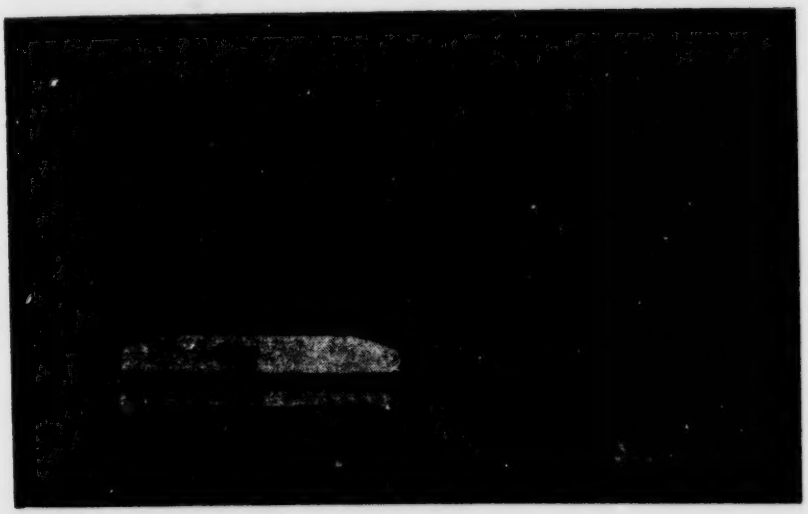

Figure 2b. The 10 cm Macauley sampler with accessories.

Figure 2c. The piston sampler in use.

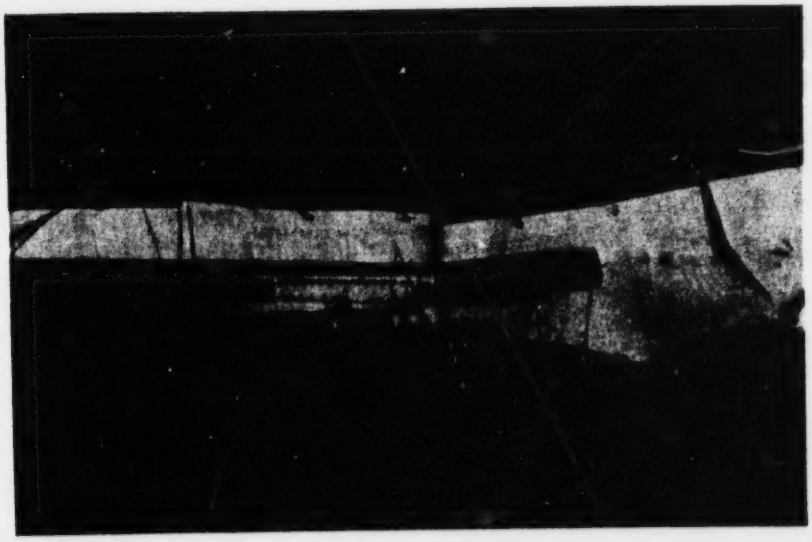

Figure 2d. Sample recovery from the piston sampler.

Figure 2e. The Macauley sampler in use.

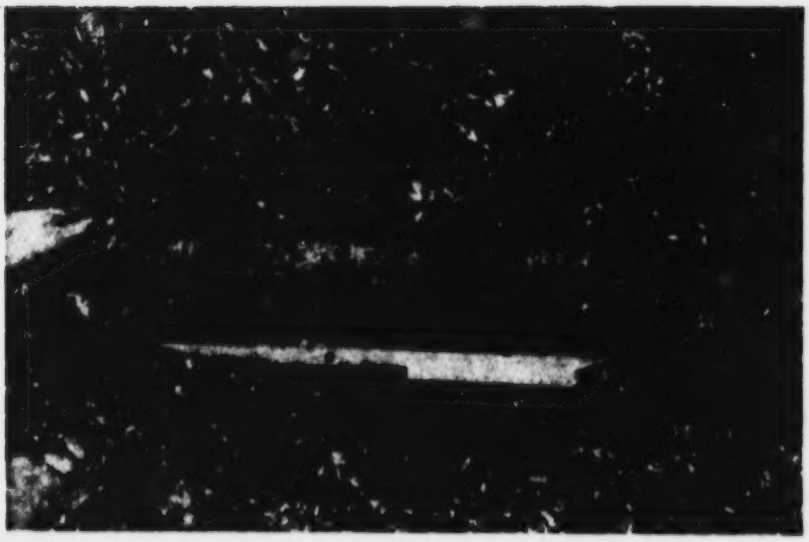

Figure 2f. Sample recovery from the Macauley sampler.

obtained were substantially higher than those reported in the literature. It was determined that the high values observed were probably the result of compression of the sample at the time it entered the cylinder or as it was removed or both. Thus, it became necessary to use a different type of sampler in 1980 and 1981.

Both a 10 cm diameter modified piston sampler (Korpijaakko, 1981) and a 10 cm diameter Russian sampler (Tolonen, 1968) were given consideration as a replacement for the 4 cm piston sampler. The Russian sampler is commonly known as the Macauley sampler in North American literature (see, for example, Day et al. 1979) and this practise will be followed in the present study. The Macauley sampler was selected for a combination of reasons. Dry density was not the primary focus of the sampling program and a large number of samples had to be collected in a relatively short period. Thus, the longer sampling length (50 cm vs 20 cm) and relative ease of operation favoured the Macauley. A subsequent comparison of the two samplers (Tolonen and Ijas, 1982) indicates both are within the correct order of magnitude for dry density determinations.

Since volume-accurate samples were required for dry density determinations, the Macauley sampler was used in such a manner that one quarter-diameter sample could be retained for laboratory use while the second quarter-diameter was used for the field classification of the peat. When other samplers are used and undisturbed samples are required

it may be necessary to recover a second sample for classification.

In order to complete the sampling of the total peat depth at the selected site a series of successive depth increments were recovered until the bottom sediment was intersected. The Macauley (and other types of samplers) have a protruding nose or cone which extends a few centimeters beyond the sample chamber. This protrusion will disturb the uppermost portion of the subsequent sample. To avoid this disturbance, alternate samples were collected from an adjacent hole.

None of the samplers discussed have effective sample recovery in the surface layers of the peatland. Thus, the uppermost layers (to a depth of 20 to 50 cm, depending on peat type) were collected by cutting a block of peat with a long sharp knife or brush hook.

The depth increments recovered at each site were not used as separate samples. Instead, the core recovered for the entire depth of the site was examined and divided into sample sections where changes in peat type or decomposition were recognizable. The sample number, depth, botanical composition (to the nearest 10%), and degree of humification (von Post scale; See Appendix V) were recorded for each sample section according to the methods outlined in Keys and Henderson (in press), (see also Henderson and Doiron, 1982). Each sample was then placed in a plastic bag for transport to the laboratory.

Laboratory Procedure

Each sample was dried to constant weight at 105°C to determine moisture content. Dry density was then determined by calculation. While ASTM Standard Test Method D2974-71 (ASTM, 1982) indicates the residence time in the drying oven should be 16 hours, it was found that the large sample volumes in each batch resulted in a temperature drop immediately after loading the ovens. To allow sufficient time for equilibration of the temperature, the residence time was a minimum of 48 hours. Each dry sample was ground in a Quaker City Mill and again sealed in plastic to ensure moisture was not reabsorbed while awaiting further processing.

The samples were forwarded to commercial laboratories at the Research and Productivity Council (Fredericton) for determination of calorific value and sulphur content. Gross calorific value was determined in an adiabatic bomb calorimeter in accordance with the ASTM Standard Test Method (D2015-77) for Gross Calorific Value of Solid Fuel by the Adiabatic Bomb Calorimeter (ASTM, 1982). Although the procedure calls for approximately 1 g of pelletized sample, some difficulties were encountered in making a cohesive pellet. Thus, a pellet with 0.5 to 0.7 g of peat was formed and 0.3 to 0.5 g of mineral oil was added and allowed to soak into the pellet as a binder. The calorific value of the oil was known and a correction made in the calculations.

It is perhaps worthy of note that Standard D2015-77

states that the results submitted by two or more laboratories (different equipment, operators, date of test, and different portions of the same pulp) should not be considered suspect unless the two results differ by more than 100 BTU/lb (56 cal/g), dry basis.

Sulphur was determined on the bomb washings in accordance with ASTM Standard Test Method (D3177-75) for Total Sulphur in the Analysis Sample of Coal and Coke (ASTM, 1982). However, the determination was made turbidimetrically rather than by precipitation as specified. Mean sulphur content was only 0.14 percent so no corrections were made in the calculation of calorific values.

Since an ultimate analysis was completed on only 128 selected samples, the percentage of total hydrogen was not known for the majority of samples. Thus, the net calorific value was not determined. However, in the samples tested, hydrogen ranged from 3.2 to 7.6 percent with a mean of approximately 6.1 percent. Using the formula provided in Standard D2015-77 and assuming H=6.1%, then:

net cal.v.(BTU/lb)=gross cal.v.(BTU/lb)-10.30 (H X 9)

=gross cal.v.(BTU/lb)-565

where cal.v. = calorific value.

Thus, net calorific value is 565 BTU/lb (314 cal/g) lower than gross calorific value. Net calorific value is equivalent to the term effective calorific value used by some authors, e.g. Makila (1980). The fuel peat industry in

Europe often expresses energy content as effective heat content at a specified moisture content. While these terms have practical applications, most researchers use only gross calorific value and ash-free calorific value and that practise has been adopted here.

Ash content was determined by gradually increasing oven temperature to 700°C and maintaining it for eight hours, then allowing the oven to cool overnight. Initially, the determinations were made using conventional muffle furnaces. Since at least 1 g of ash was required for analysis purposes and ash contents were generally low, it was necessary to ash a large volume of material for each sample. The muffle furnace allowed only a few samples to be completed in each batch and several weeks were required to complete a large number of samples. It was found that a pottery kiln with programmable temperature regulation allowed a greater number of samples to be included in each batch.

The quantity of ash required also resulted in problems with finding a suitable container for the ashing. Several porcelain crucibles were often required for one sample. Since the samples had been finely ground, the peat tended to compact in the crucible. Incomplete ashing sometimes resulted which was probably due to low oxygen availability caused by a combination of compaction of the sample and the small surface area exposed in the highwalled crucibles. In an attempt to increase the exposed surface area and reduce the number of containers required for each sample, glazed

porcelain evaporating dishes were used. These were unsatisfactory, since they tended to fracture after a few heatings. However, 200 ml Vitresil evaporating dishes withstood repeated heatings and held a large volume of sample. Ashing was generally complete using these containers.

Statistical Treatment of the Data

The sample identification number, peat type, humification, gross calorific value, dry density, and ash content for each sample were entered into a computer file and checked for input errors. Ash-free calorific value was then calculated for each sample. Standard statistical packages (Dixon and Brown, 1979) were used to further evaluate the data. Cumulative frequency distributions and histograms of each variable were carefully examined for extreme values and any further data entry errors were corrected. This examination also indicated various trends in the data and accentuated anomalous results. Scatter plots of various cases were produced and evaluated in conjunction with calculated means, ranges and standard deviations.

Simple linear regression was used to produce curves of the various relationships and the coefficient of correlation (r) was calculated for each.

RESULTS

A total of 113 sites on 94 peatlands were sampled. A data file for the 892 samples was created and is displayed in Appendix I.

Cumulative frequency diagrams and histograms of the gross calorific value, ash-free calorific value, and ash content for the data file were examined to evaluate trends and assess anomalous results. The data file was then grouped and the number of samples, mean, standard deviation, and range of gross calorific value, ash-free calorific value, and ash content was determined for each degree of humification (Appendix Tables II-1, III-1, and IV-1). Scatter plots of gross calorific value and ash-free calorific value against humification were produced and are shown in Figures 3 and 4. Sixty samples with missing values for humification are not included in the tables and figures. These include samples classified as ooze for which humification was not determined. The linear regression equation and the mean values from the tables have been superimposed on the figures. A considerable number of extreme values can be observed.

An examination of these extreme values indicated many of the low results for gross calorific value and many of the high results for ash-free calorific value were samples with high ash content. An examination of the frequency distribution of ash content (Figure 5) showed a relatively low

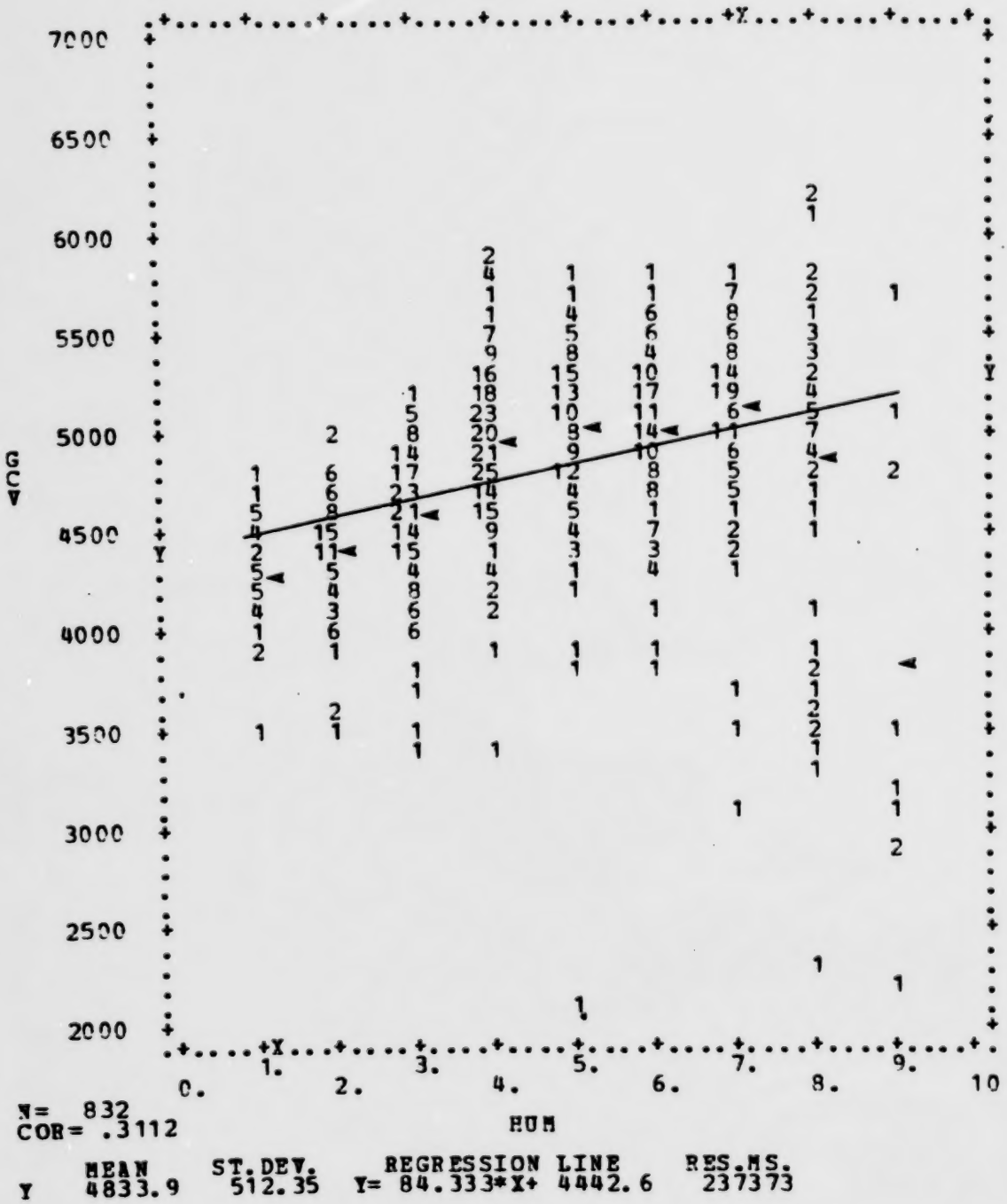

Figure 3. Scatter plot of gross calorific value (GCV) against degree of humification (HUM) for all samples. Values plotted are number of observations. Arrows indicate means from Table II-1.

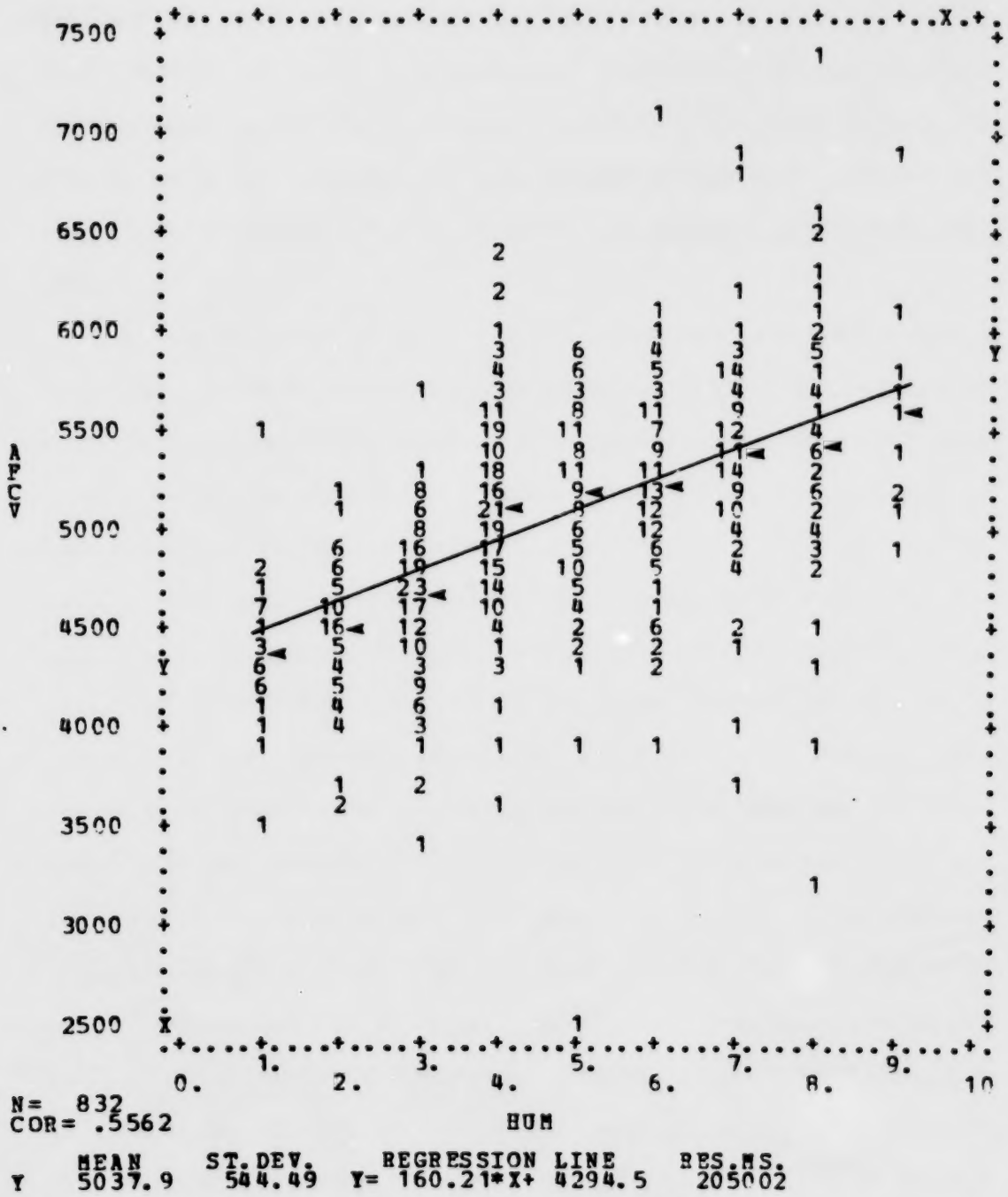

Figure 4. Scatter plot of ash-free calorific value (AFCV) against degree of humification (HUM) for all samples. Values plotted are number of observations. Arrows indicate means from Table III-1.

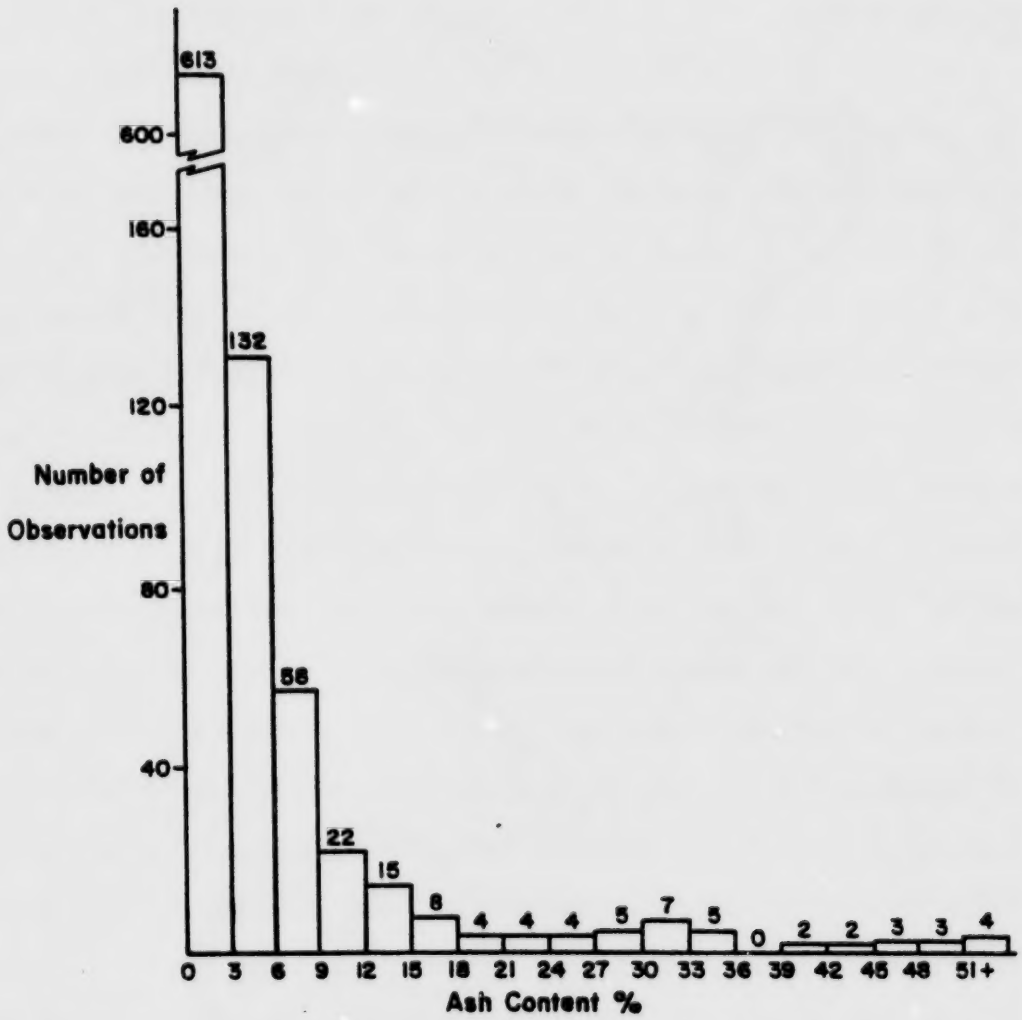

Figure 5. Frequency distribution of ash content observations.

frequency of observations above 15 percent and it was decided to test the effect of exclusion of samples above this value. It was subsequently learned that a Standard Classification of Peat Samples proposed by ASTM Committee D18.18 uses 15 percent as the boundary between medium and high ash samples (P.M. Jarrett, personal communication, 1983).

A new data file was created which excluded 52 samples with ash content exceeding 15 percent. All samples which were field classified as ooze were among those excluded. The mean, standard deviation, and range for each degree of humification of gross calorific value, ash-free calorific value, and ash content were again determined for the new data file (Appendix Tables II-2, III-2, and IV-2). Scatter plots of gross calorific value and ash-free calorific value against humification are shown in Figures 6 and 7. The regression equations and mean values from the tables have been plotted again. Forty-two samples with missing values for humification were excluded from the figures and tables.

Exclusion of the high ash samples increased the mean of gross calorific value at all degrees of humification which had samples excluded (Appendix Tables II-1 and II-2). The standard deviations showed a decrease. The upper limits of the ranges remained constant but the lower limits showed substantial increases. The coefficient of correlation between gross calorific value and humification increased

from 0.3112 to 0.5491. Comparison of Figure 6 to Figure 3 shows the scatter of low values was reduced by the exclusion of the high ash samples. The slope of the regression line increased and the mean values showed a closer correspondance to the regression line.

For the ash-free calorific value results, exclusion of the high ash samples caused a small decrease in the overall mean and the means of the majority of degrees of humification which had samples excluded (Appendix Tables III-1 and III-2). Two humification groups (H5 and H8), however, showed slight increases in the mean. The standard deviations decreased in all cases. The upper limit of the ranges decreased in all affected cases, whereas the lower limit of the ranges remained constant except for the two cases which showed increases in the mean. The coefficient of correlation between ash-free calorific value and humification increased from 0.5562 to 0.5749. Comparison of Figure 7 to Figure 4 showed less scatter of values. However, the change in the regression equation was extremely slight. This would indicate that high ash content has a negligible effect on the relationship between ash-free calorific value and degree of humification.

Ash content followed anticipated trends by the exclusion of the high ash samples (Appendix Tables IV-1 and IV-2). Means, standard deviations and the upper limit of the ranges all decreased. The coefficient of correlation between

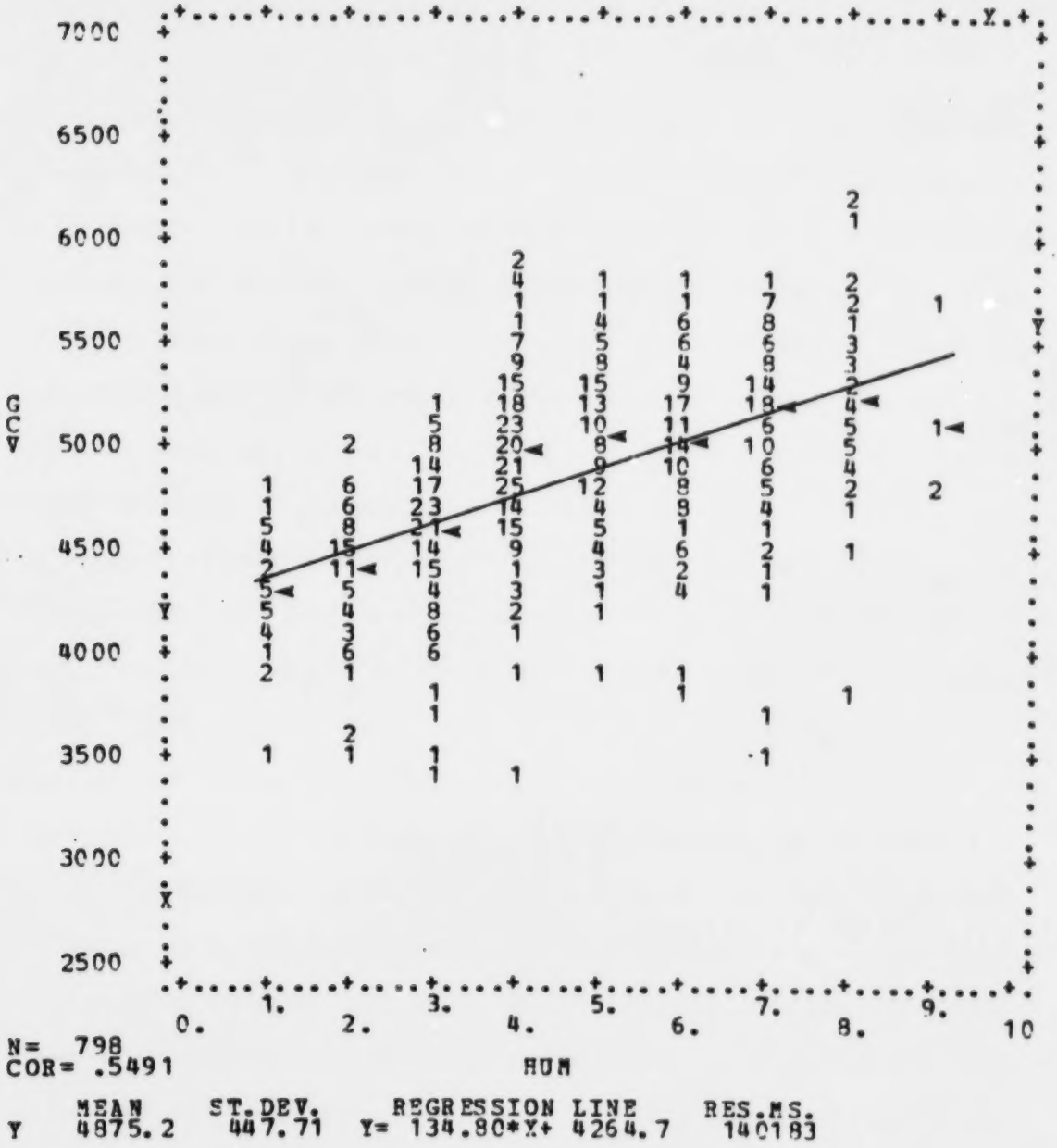

Figure 6. Scatter plot of gross calorific value (GCV) against degree of humification (HUM) for samples with less than 15 percent ash. Values plotted are number of observations. Arrows indicate means from Table II-2.

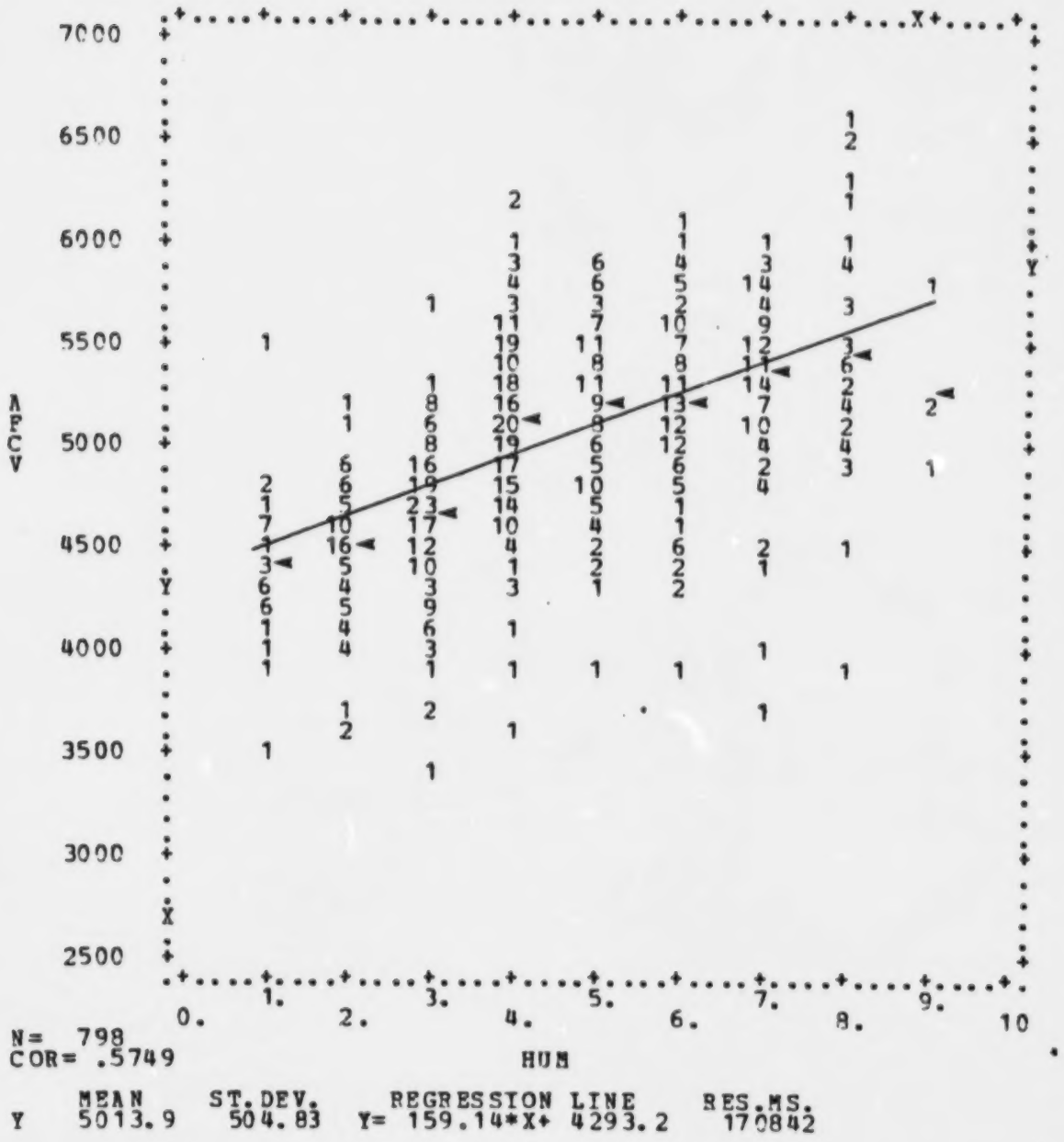

Figure 7. Scatter plot of ash-free calorific value (AFCV) against degree of humification (HUM) for samples with less than 15 percent ash. Values plotted are number of observations. Arrows indicate means from III-2.

ash content and humification was low for all samples (r=0.3726) but exclusion of the high ash samples resulted in an even lower value (r=0.2664).

There were a number of observations which appeared anomalously low on both Figure 6 and Figure 7. The results for these samples were carefully evaluated but a common denominator was not found. A test calculation of the data file without these samples showed only a modest increase in the means and in the coefficient of correlation. Since there was no apparent reason for exclusion of these results, they were allowed to remain in the data file.

The effect of ash content on the scatter of observations was further evaluated by plotting gross calorific value against ash-free calorific value. Figure 8 shows this plot for all samples, while Figure 9 shows the same variables after the exclusion of samples with over 15 percent ash. Comparison of the two figures illustrates the reduced scatter achieved by exclusion of the high ash samples. Although the exclusion of high ash samples had been previously shown to have a negligible effect if only ash-free calorific value was considered, it was decided that the reduced scatter of observations achieved warranted the exclusion of high ash samples in all further calculations.

The data were then subdivided according to major peat type group. A data file was created which consisted of 598 sphagnum peat samples, i.e. those dominated (over 50%) by

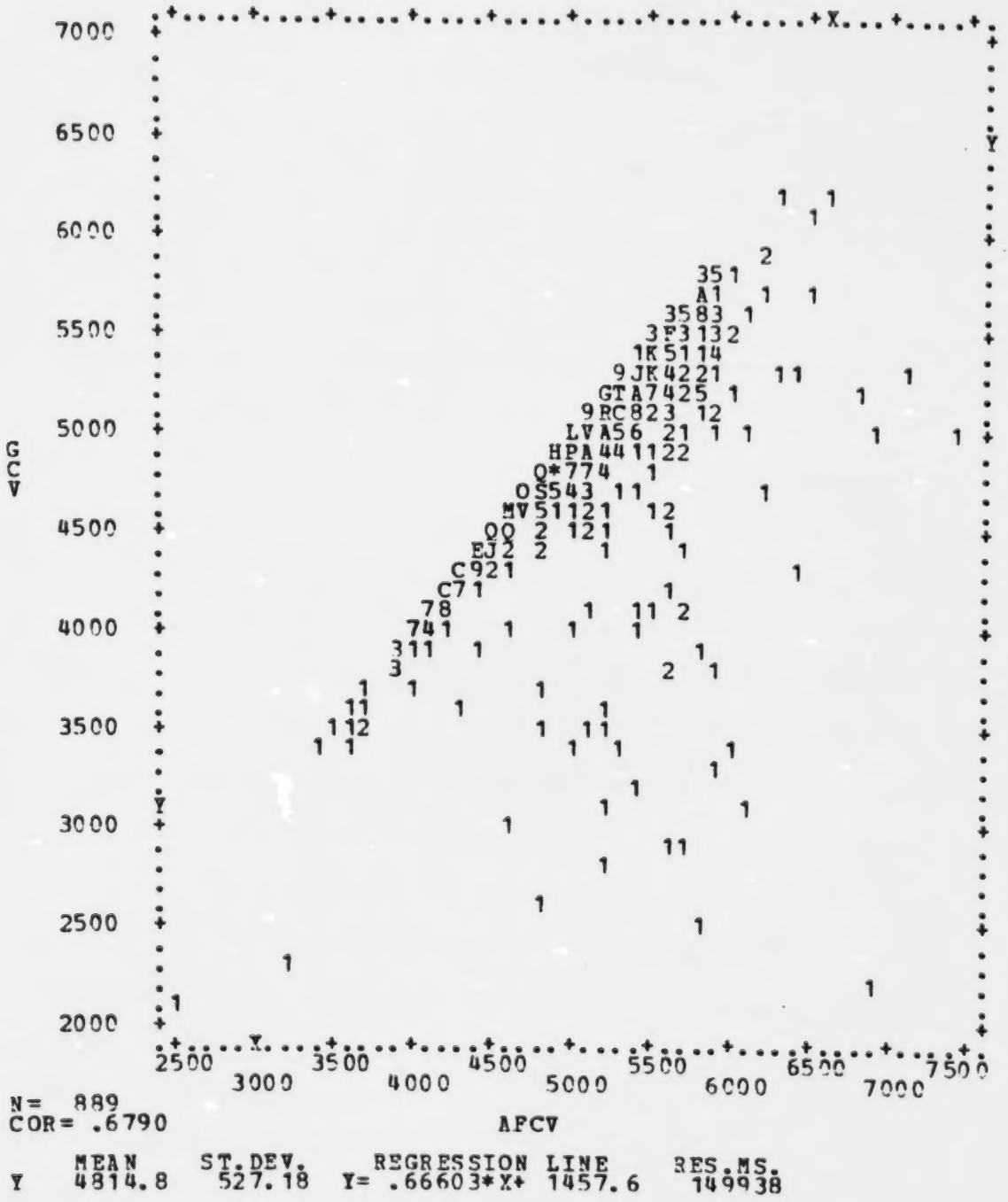

Figure 8. Scatter plot of gross calorific value (GCV) against ash-free calorific value (AFCV) for all samples. Letters indicate 10 to 36 observations. Asterisks indicate over 36 observations.

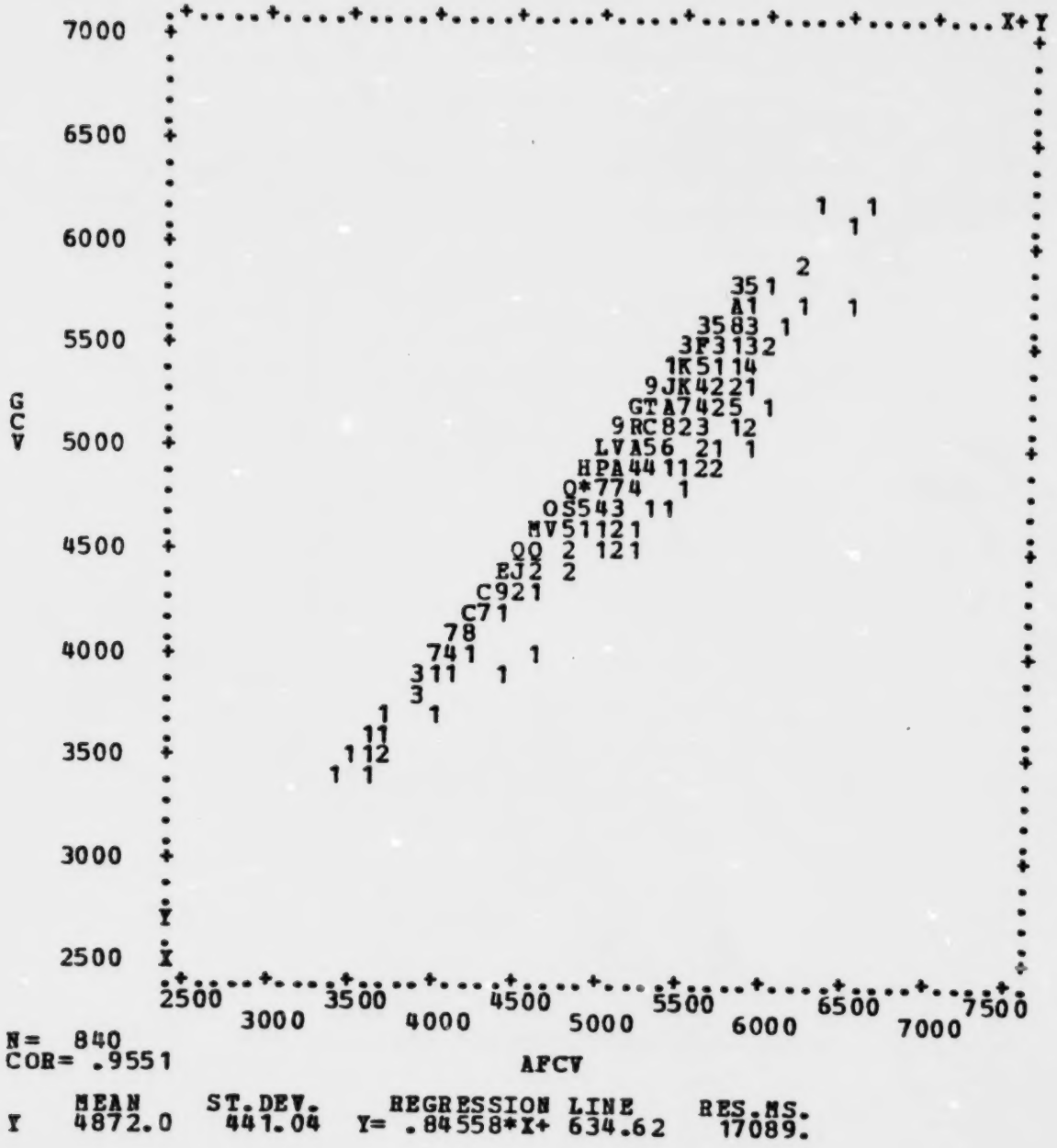

Figure 9. Scatter plot of gross calorific value (GCV) against ash-free calorific value (AFCV) for samples with less 15 percent ash. Letters indicate 10 to 36 observations. Asterisks indicate over 36 observations.

Sphagnum, whereas a second file of 206 samples consisted of sedge peat samples, i.e. those dominated by Carex. Thirty samples where peat type was not recorded and 6 samples dominated by Bryales were not included in further calculations.

Sphagnum Peat Samples

The mean, standard deviation, and range of gross calorific value, ash-free calorific value and ash content were determined for each degree of humification (Appendix Tables II-3, III-3, and IV-3). Fourteen samples were not included in the calculation due to missing values for humification.

The results show sphagnum peats to have lower calorific values and lower ash contents than were observed for all samples. The coefficient of correlation to humification was slightly higher for both gross (r=0.6104) and ash-free calorific value (r=0.6269) than was observed for all samples. The regression equations from Appendix Tables II-3 and III-3 are compared to those for all samples and for sedge peats in Figures 10 and 11.

Sedge Peat Samples

The mean, standard deviation and range of gross calorific value, ash-free calorific value and ash content were determined for each degree of humification (Appendix Tables II-4, III-4, and IV-4).

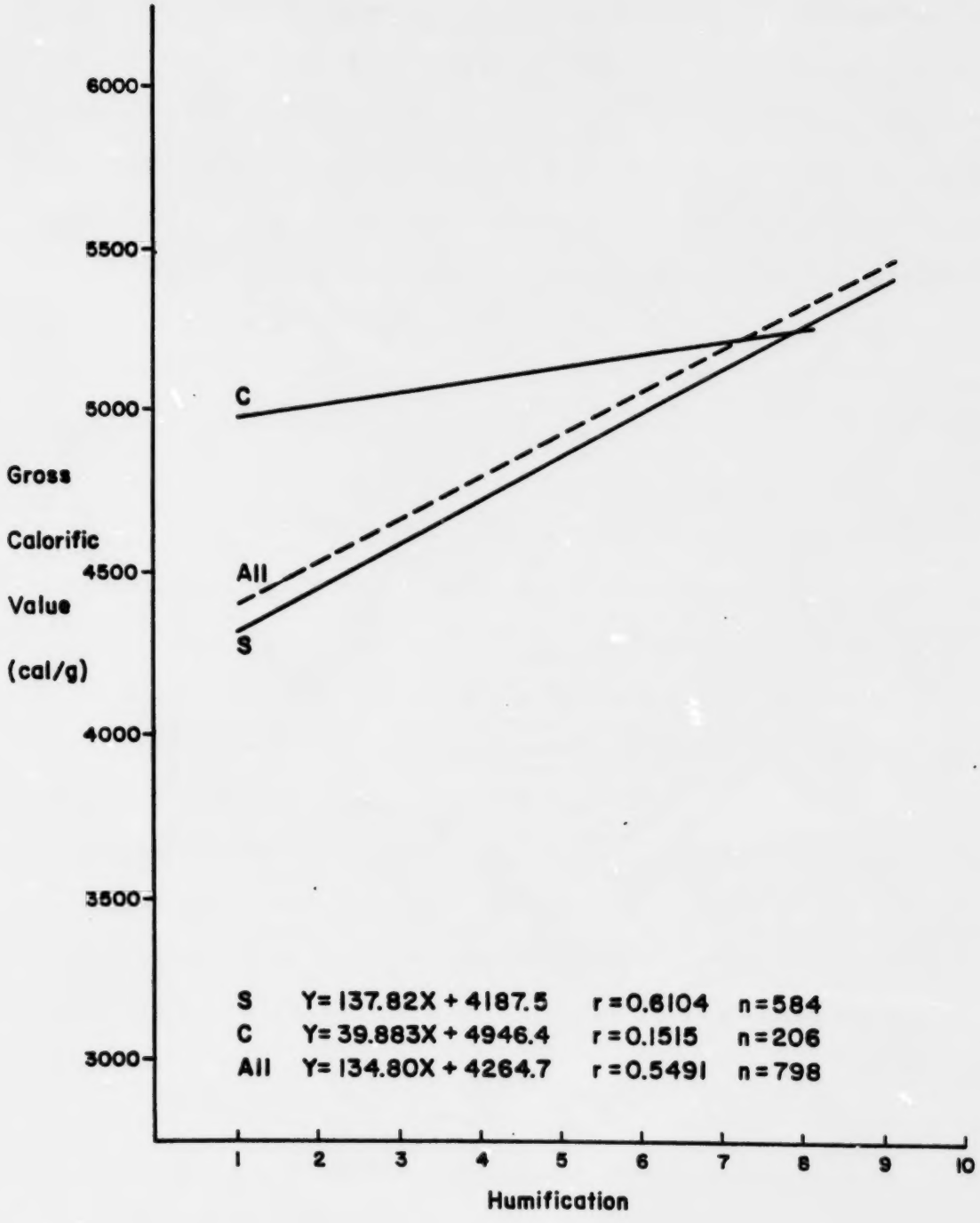

Figure 10. Comparison of regression equations of gross calorific value for sphagnum peats (S), sedge peats (C), and all samples.

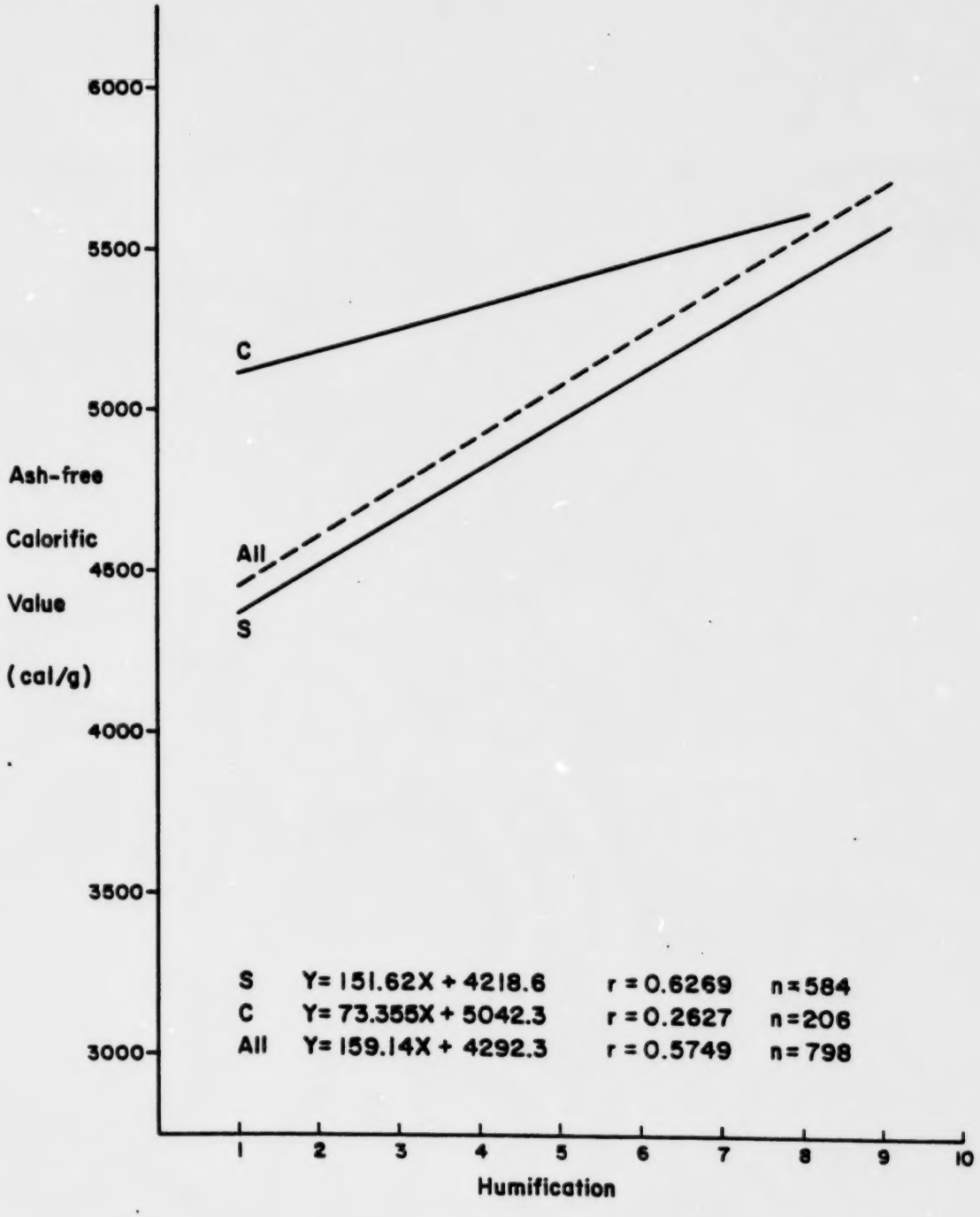

Figure 11. Comparison of regression equations of ash-free calorific value for sphagnum peats (S), sedge peats (C), and all samples.

The results show sedge peats to have higher calorific values and higher ash contents than were observed for all samples. The coefficient of correlation to humification was low for both gross (r=0.1515) and ash-free calorific value (r=0.2627). The regression equations from Tables II-4 and III-4 are compared to those for all samples and for sphagnum peats in Figures 10 and 11.

Subdivision of Sphagnum Peat Samples

The 598 sphagnum peat samples were further grouped according to botanical composition. Mean values for the seven groups are shown in Table 2. Twelve samples comprising 6 infrequently found peat types were not included in the groupings. The table also provides subtotals when Carex (C) is a subdominant, i.e. CS-peats, as well as totals for samples without Carex, i.e. S-peats.

Examination of Table 2 indicated only small differences between means of the same variable in lines 1 to 4, i.e. within the CS group. However, the CS group was observed to have larger differences with respect to the majority of the results shown in lines 5 to 9 of Table 2 (S-peats). In addition, there were substantial differences within the S-peat group. This would appear to indicate that the differences in the mean values shown are directly related to botanical composition. However, upon closer examination, it was noted in all cases where substantial differences in

Group No.	Peat Type	Number of Samples	Mean of Gross Calorific Value (cal/g)	Mean of Ash-free Calorific Value (cal/g)	Mean of Ash Content %	Mean Dry Density (kg/m^3)/#	Avg. H
1	CS	41	5194.3	5347.8	2.81	89.9/21	5.9
2	NCS	41	5046.7	5193.0	2.79	98.6/7	6.0
3	LCS	6	5019.0	5299.8	5.36	99.0/3	5.3
4	Total 1-3	88	5113.5	5272.4	2.97	92.7/31	5.9
5	S	291	4650.5	4716.6	1.37	70.3/91	3.5
6	NS	170	4813.6	4884.0	1.42	77.7/28	4.6
7	LS	26	4939.3	5230.6	5.57	95.6/8	6.4
8	ErS	11	4606.4	4723.0	2.48	76.0/1	3.7
9	Total 5-8	498	4720.1	4800.5	1.63	73.5/128	4.0
10	ALL	586	4779.0	4871.2	1.83	77.3/159	4.3

Table 2. Mean values of the peat type groups for sphagnum peat samples. (See Appendix I for explanation of peat type codes.).

means were found, the average humification of the samples was also substantially different. Hence, the observed differences in the means probably reflect differences in sample population, i.e. average degree of humification, and cannot be directly attributed to changes in botanical composition.

Correlation matrices (Table 3) for the peat type groups were also evaluated for differences between botanical compositions. However, there were no discernible trends.

It was noted in Table 2 that high ash contents were observed in peats containing wood (L). In addition, CS-peats had generally higher ash contents than were observed for S-peats. Since these peats commonly occur in environments where deposition of mineral sediments is likely to occur, it is assumed that these observations are directly related to the environment of deposition of the peats.

To further evaluate differences between botanical groups within the sphagnum peat samples, the regression equations of both gross and ash-free calorific value against humification was plotted for each grouping and are shown in Figures 12 and 13 respectively. Many of the apparent differences indicated in Table 2 are shown by the figures to be of a relatively small magnitude. The trend observed from Table 2 of CS-peats having higher calorific values than S-peats remains valid on the Figures. This appears logical since sedge peats were previously shown (Figures 10 and 11)

Group 1: CS Peats	Humification	Dry Density	Gross Calorific Value	Ash	Ash-free Calorific Value
Humification	1.0000				
Dry Density	0.4744	1.0000			
Gross Calorific Value	0.5300	0.2619	1.0000		
Ash	0.0836	0.0622	0.0402	1.0000	
Ash-free Calorific Value	0.5248	0.2694	0.9539	0.3376	1.0000
Group 2: NCS Peats					
Humification	1.0000				
Dry Density	0.0751	1.0000			
Gross Calorific Value	0.2677	0.0460	1.0000		
Ash	-0.0604	0.0702	-0.0533	1.0000	
Ash-free Calorific Value	0.2577	0.0583	0.9831	0.1299	1.0000
Group 3: LCS Peats					
Humification	1.0000				
Dry Density	0.4077	1.0000			
Gross Calorific Value	0.5339	-0.4145	1.0000		
Ash	-0.3338	0.5050	-0.7947	1.0000	
Ash-free Calorific Value	0.5087	-0.1915	0.8236	-0.3104	1.0000

Table 3. Correlation matrices of the peat type groups for sphagnum peat samples shown in Table 2.

Group 4: Groups 1 to 3 Combined CS Peats	Humification	Dry Density	Gross Calorific Value	Ash	Ash-free Calorific Value
Humification	1.0000				
Dry Density	0.3453	1.0000			
Gross Calorific Value	0.3759	0.1345	1.0000		
Ash	-0.0420	0.0746	-0.0924	1.0000	
Ash-free Calorific Value	0.3615	0.1532	0.9635	0.1769	1.0000
Group 5: S Peats					
Humification	1.0000				
Dry Density	0.4078	1.0000			
Gross Calorific Value	0.6146	0.3154	1.0000		
Ash	0.0734	0.0516	0.1431	1.0000	
Ash-free Calorific Value	0.6070	0.3135	0.9886	0.2900	1.0000
Group 6: NS Peats					
Humification	1.0000				
Dry Density	0.1857	1.0000			
Gross Calorific Value	0.5175	0.0713	1.0000		
Ash	0.0532	-0.1081	0.1811	1.0000	
Ash-free Calorific Value	0.5090	0.0558	0.9921	0.3030	1.0000

Table 3 Continued

Group 7: LS Peats	Humification	Dry Density	Gross Calorific Value	Ash	Ash-free Calorific Value
Humification	1.0000				
Dry Density	0.1308	1.0000			
Gross Calorific Value	0.1423	0.0914	1.0000		
Ash	0.0005	0.2675	-0.4871	1.0000	
Ash-free Calorific Value	0.1575	0.2482	0.8800	-0.0145	1.0000
Group 8: ErS Peats					
Humification	1.0000				
Dry Density	0.0	0.0			
Gross Calorific Value	0.5856	0.0	1.0000		
Ash	-0.0103	0.0	-0.3270	1.0000	
Ash-free Calorific Value	0.6195	0.0	0.9558	-0.0348	1.0000
Group 9: Groups 5. to 8 Combined S Peats					
Humification	1.0000				
Dry Density	0.3234	1.0000			
Gross Calorific Value	0.5909	0.2284	1.0000		
Ash	0.1888	0.1008	0.0930	1.0000	
Ash-free Calorific Value	0.6065	0.2413	0.9779	0.2984	1.0000

Table 3 Continued

Group 10: Groups 4 and 9 Combined	Humification	Dry Density	Gross Calorific Value	Ash	Ash-free Calorific Value
Humification	1.0000				
Dry Density	0.3341	1.0000			
Gross Calorific Value	0.6055	0.2289	1.0000		
Ash	0.2247	0.1275	0.1310	1.0000	
Ash-free Calorific Value	0.6223	0.2456	0.9773	0.3375	1.0000

Table 3 Continued

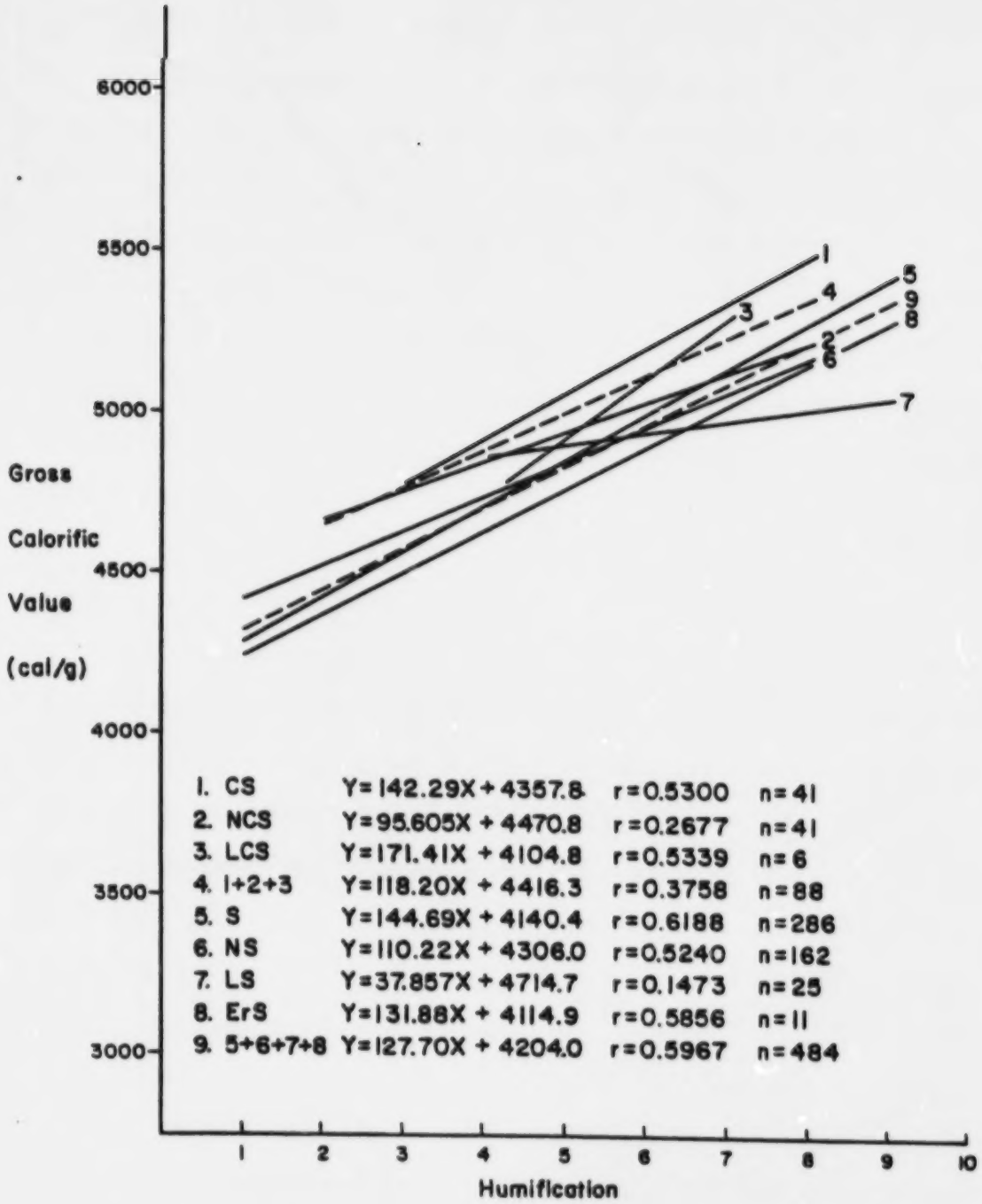

Figure 12. Regression equations of gross calorific value against humification for the groups of sphagnum peat samples shown in Table 2.

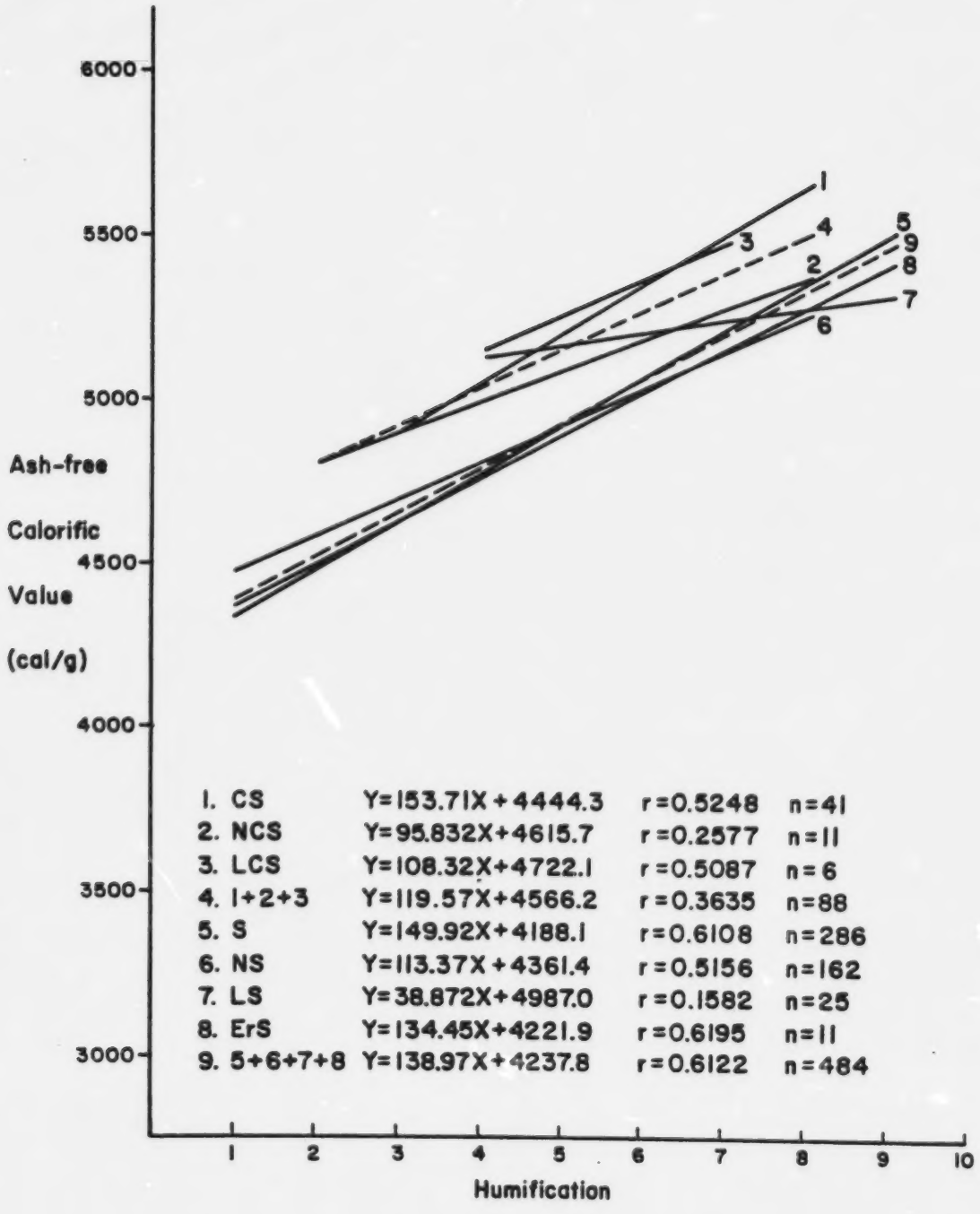

Figure 13. Regression equations of ash-free calorific value against humification for the groups of sphagnum peat samples shown in Table 2.

to have higher calorific values than sphagnum peats.

The relatively small differences observed by further subdivision of the CS-peats and S-peats would indicate that the minor peat constituents such as shrubs (N), wood (L), and Eriophorum (Er) have relatively little significance in the overall calorific value. In the large majority of cases these constituents comprised only 10 to 20 percent of the sample. It is, however, interesting to note that higher calorific values were observed in samples without these minor constituents.

Subdivision of Sedge Peat Samples

The 206 sedge peat samples were further grouped according to botanical composition. Mean values for the five groups are shown in Table 4. Twelve samples comprising seven infrequently found peat types (none of which contained Sphagnum) were not included in the calculations. The table also gives subtotals when Sphagnum (S) is a subdominant, i.e. SC-peats, as well as totals for samples without Sphagnum, i.e. C-peats.

Examination of Table 4 indicated only small differences between means of the same variable. Examination of the correlation matrices (Table 5) again did not indicate trends which could be used to differentiate between botanical groups. As with the sphagnum peat samples, it was noted that the presence of wood (L) corresponded to high ash contents.

Group No.	Peat Type	Number of Samples	Mean of Gross Calorific Value (cal/g)	Mean of Ash-free Calorific Value (cal/g)	Mean of Ash Content %	Mean Dry Density (kg/m^3)/#	Avg. H
1	SC	56	5215.5	5464.8	4.46	90.7/25	5.6
2	NSC	40	5207.7	5437.3	4.19	84.1/10	5.4
3	LSC	23	5012.2	5389.6	6.92	86.8/8	5.8
4	Total 1-3	119	5173.5	5440.9	4.84	88.4/43	5.6
5	C	33	5172.2	5469.5	5.39	91.0/18	4.5
6	NC	42	5096.8	5342.7	4.57	86.3/15	4.5
7	Total 5 & 6	75	5129.9	5398.4	4.93	88.9/33	4.5
8	ALL	194	5156.6	5424.4	4.87	88.6/76	5.2

Table 4. Mean values of peat type groups for sedge peat samples. (See Appendix I for explanation of peat type codes.).

Group 1: SC Peats	Humification	Dry Density	Gross Calorific Value	Ash	Ash-free Calorific Value
Humification	1.0000				
Dry Density	0.2501	1.0000			
Gross Calorific Value	0.2654	0.0768	1.0000		
Ash	0.0460	0.1210	-0.0945	1.0000	
Ash-free Calorific Value	0.2710	0.1278	0.8722	0.4033	1.0000
Group 2: NSC Peats					
Humification	1.0000				
Dry Density	0.1979	1.0000			
Gross Calorific Value	0.0295	0.1079	1.0000		
Ash	0.2815	0.0072	-0.3356	1.0000	
Ash-free Calorific Value	0.1597	0.1137	0.8887	0.1319	1.0000
Group 3: LSC Peats					
Humification	1.0000				
Dry Density	-0.1206	1.0000			
Gross Calorific Value	0.3011	-0.0730	1.0000		
Ash	0.4426	-0.1189	-0.2030	1.0000	
Ash-free Calorific Value	0.5475	-0.1348	0.8028	0.4203	1.0000

Table 5. Correlation matrices of the peat type groups for sedge peat samples shown in Table 4.

Group 4: Groups 1 to 3 Combined SC Peats	Humification	Dry Density	Gross Calorific Value	Ash	Ash-free Calorific Value
Humification	1.0000				
Dry Density	0.1885	1.0000			
Gross Calorific Value	0.1660	0.0510	1.0000		
Ash	0.2021	0.0828	-0.2502	1.0000	
Ash-free Calorific Value	0.2700	0.0928	0.8592	0.2791	1.0000

Group 5: C Peats					
Humification	1.0000				
Dry Density	0.3076	1.0000			
Gross Calorific Value	-0.1136	0.0797	1.0000		
Ash	0.3801	0.1689	-0.4869	1.0000	
Ash-free Calorific Value	0.2035	0.2401	0.6685	0.3237	1.0000

Group 6: NC Peats					
Humification	1.0000				
Dry Density	0.0303	1.0000			
Gross Calorific Value	0.1164	0.1156	1.0000		
Ash	0.2803	0.0085	-0.1915	1.0000	
Ash-free Calorific Value	0.2147	0.1211	0.9409	0.1520	1.0000

Table 5 Continued

Group 7: Groups 5 and 6 Combined C Peats	Humification	Dry Density	Gross Calorific Value	Ash	Ash-free Calorific Value
Humification	1.0000				
Dry Density	0.2066	1.0000			
Gross Calorific Value	0.0243	0.1012	1.0000		
Ash	0.3329	0.1309	-0.2679	1.0000	
Ash-free Calorific Value	0.1890	0.1713	0.8819	0.2177	1.0000
Group 8: Groups 4 and 7 Combined					
Humification	1.0000				
Dry Density	0.1784	1.0000			
Gross Calorific Value	0.1337	0.0684	1.0000		
Ash	0.2189	0.0986	-0.2562	1.0000	
Ash-free Calorific Value	0.2465	0.1196	0.8676	0.2574	1.0000

Table 5 Continued

Pure Carex samples also had higher ash contents than were observed for mixed peat types. Again, these observations can be related to the environment of deposition of the peat in that these peat types frequently occur in environments where deposition of mineral sediments could be anticipated.

The regression equations of both gross and ash-free calorific value against humification were plotted for each botanical group within the sedge peat samples and are displayed in Figures 14 and 15. The close spacing of the regression lines indicate botanical differences within the sedge peat samples have a relatively insignificant influence on calorific value. Furthermore, the differences between the SC-peats and C-peats are very small and of little consequence. These observations are particularly valid on an ash-free basis.

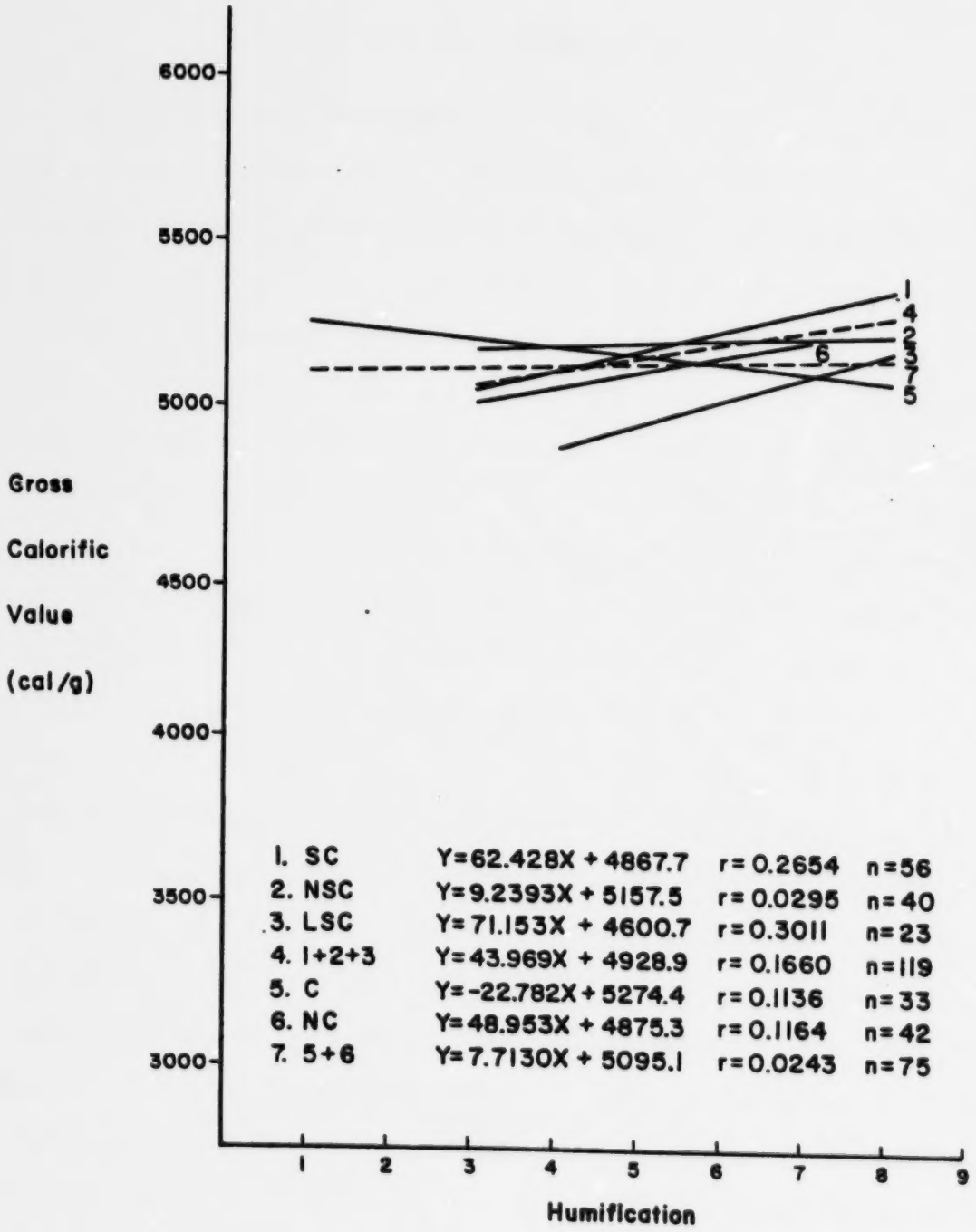

Figure 14. Regression equations of gross calorific value against humification for the groups of sedge peat samples shown in Table 4.

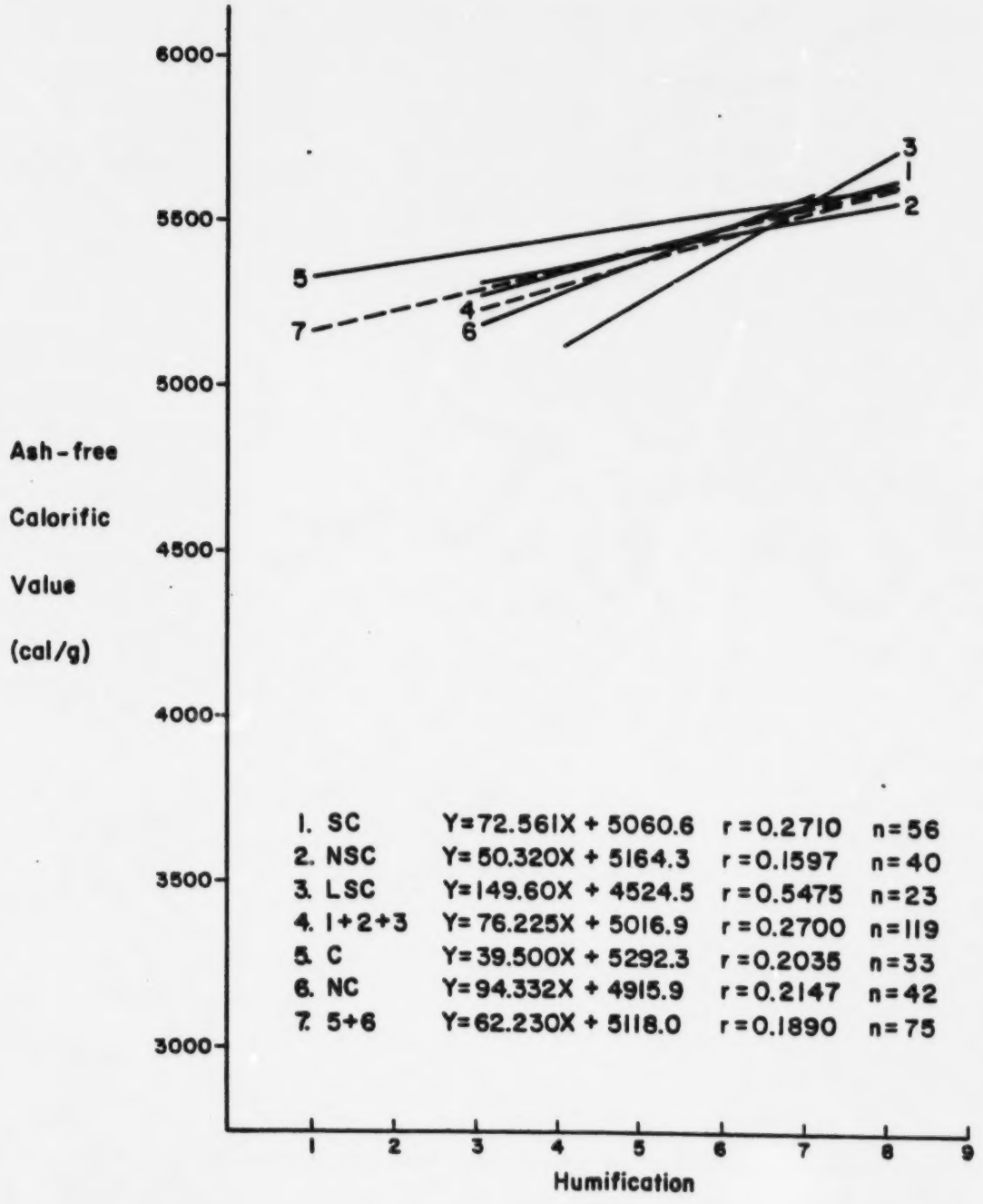

Figure 15. Regression equations of ash-free calorific value against humification for the groups of sedge peat samples shown in Table 4.

VOLUMETRIC EXPRESSION OF RESULTS

When a field assessment of a peatland is carried out to determine the potential for peat extraction the *in situ* volume of peat in the deposit is normally estimated. This *in situ* volume is then converted to tonnage when the energy yield of a deposit is considered. The *in situ* dry density, *i.e.* the weight of dry (0% moisture) solids for a given *in situ* volume was determined for samples collected in 1980 and 1981. The observed values are shown in Appendix I, while means and number of observations for various peat type groups are given in Tables 2 and 4. Coefficients of correlation of dry density to other variables are shown for peat type groupings in Tables 3 and 5.

The unit for calorific value used in this study is cal/g. This is equivalent to kcal/kg. Dry density has been expressed in kg/m^3. Multiplication of the two variables produces results in $kcal/m^3$. After completion of this calculation on a gross and ash-free basis, the regression equations against humification for sphagnum peat samples were plotted (Figures 16 and 17). The curves show a large increase in calorific value with increased degree of humification. Differences due to botanical composition were not substantially different than were previously observed on a weight basis.

Figures 18 and 19 display similar information for sedge peat samples. Some differences related to botanical composi-

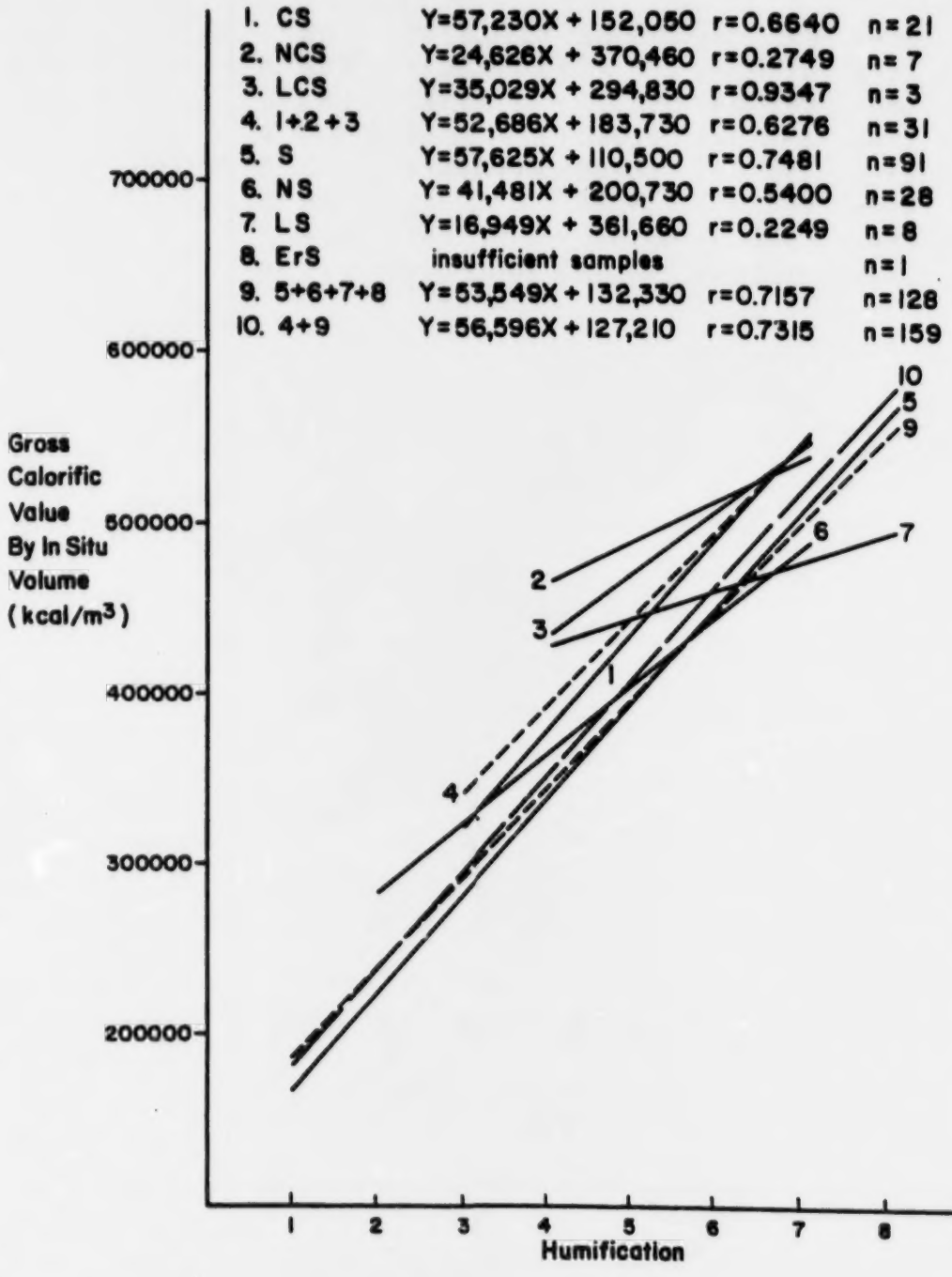

Figure 16. Regression equations of gross calorific value by in situ volume against humification for the groups of sphagnum peat samples shown in Table 2.

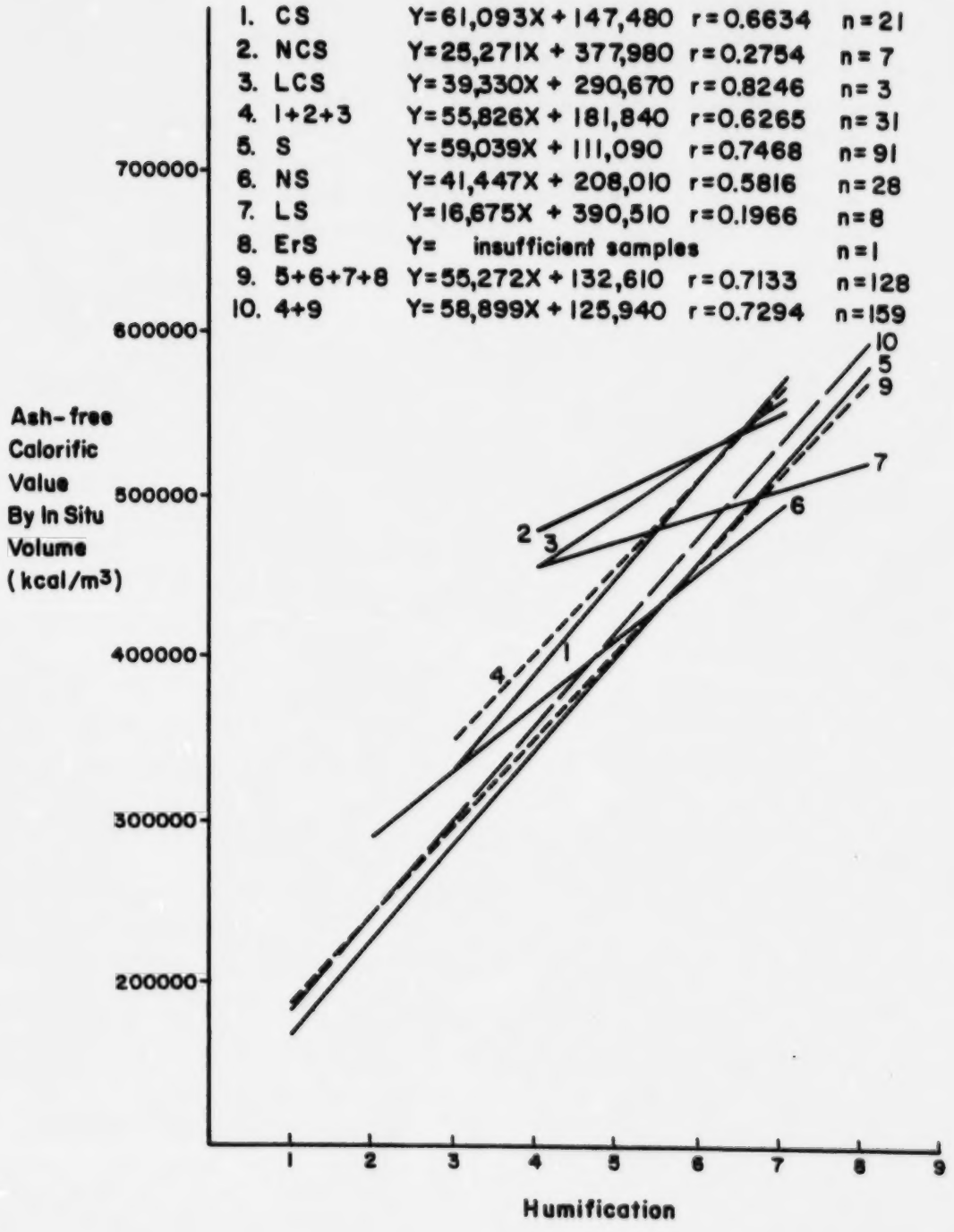

Figure 17. Regression equations of ash-free calorific value by in situ volume against humification for the groups of sphagnum peat samples shown in Table 2.

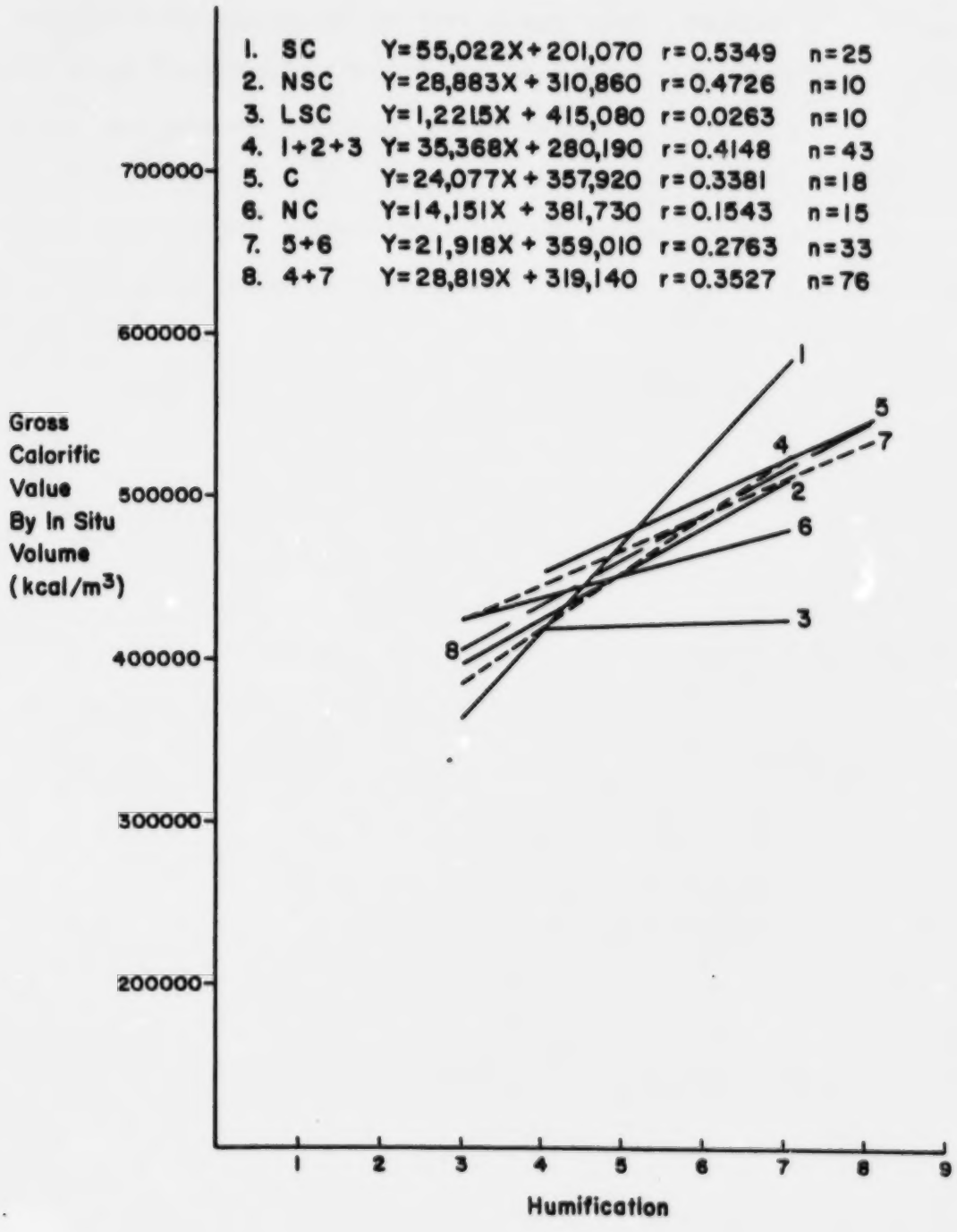

Figure 18. Regression equations of gross calorific value by in situ volume against humification for the groups of sedge peat samples shown in Table 4.

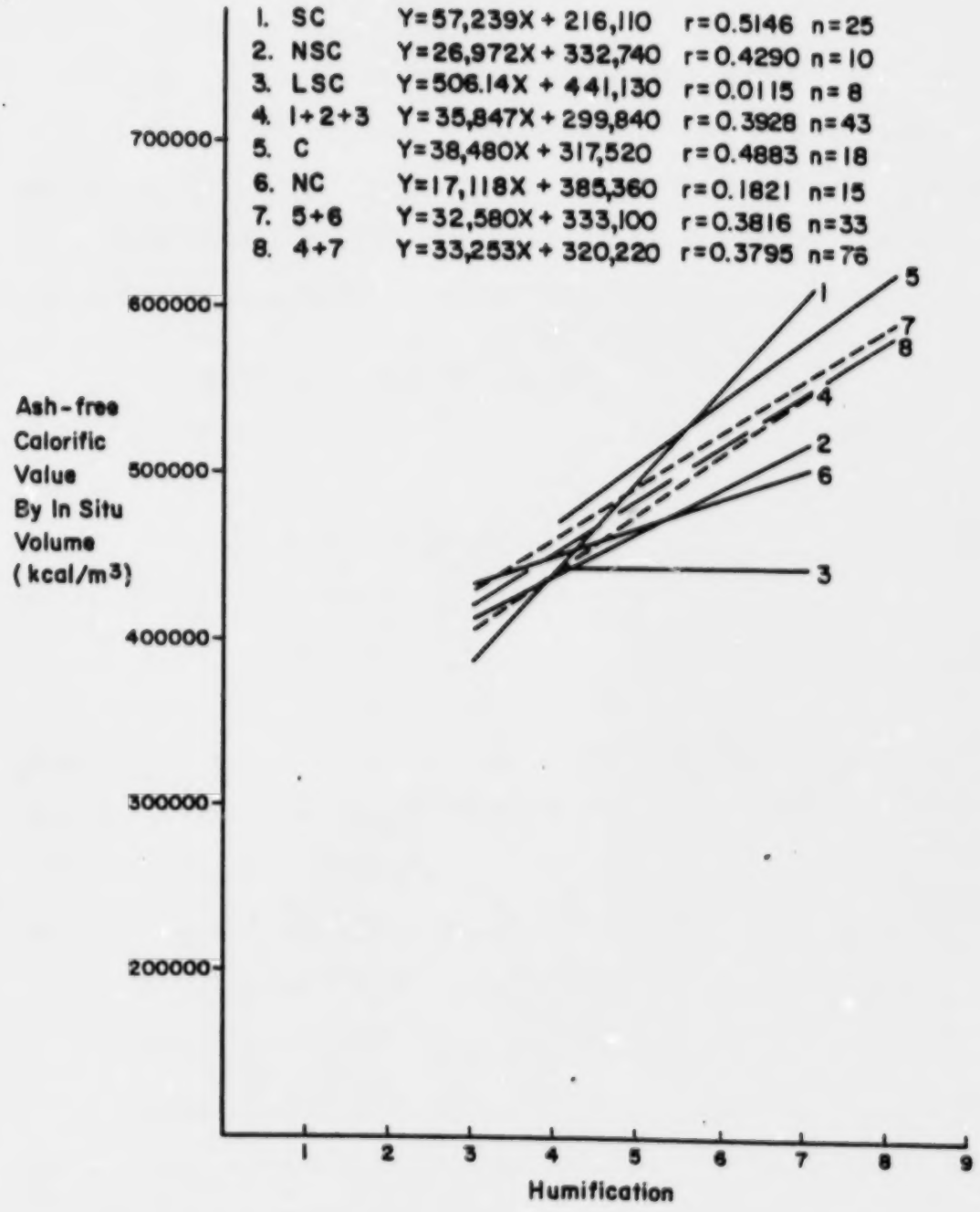

Figure 19. Regression equations of ash-free calorific value by in situ volume against humification for the groups of sedge peat samples shown in Table 4.

tion can be observed in the sedge peat samples. The overall rate of increase relative to degree of humification is less than was observed for sphagnum peats.

The coefficients of correlation are generally higher in both peat type groups than was observed on a weight basis. This may be a reflection of the lesser number of volumetric observations.

DISCUSSION

Using the results, the total energy content of a peat deposit can be estimated from data which are commonly available from an inventory program. To illustrate this, data from the peatland inventory program of N.B. Natural Resources have been used in the following examples.

Example 1: Potential Energy Yield, Bog 337

Inventory Data:

Volume = 14.87 million cubic metres

Average Humification (weighted) 3.5

Peat Types - sphagnum 95.8%

- sedge 4.2%

Using the average humification and equation 10 on Figure 16, the gross calorific volume for the sphagnum peats was determined to be 325,300 kcal/m^3. Since sphagnum peats comprise 95.8% of the total volume, then:

Energy Content (sphagnum peats)

= 325,300 X .958 X (14.87 X 10^6)

= 4.63 X 10^{12} kcal

Similarily, the gross calorific volume for the sedge peats was determined to be 420,010 kcal/m^3 using the equation 8 on Figure 18. Thus:

Energy Content (sedge peats)

= 420,000 X .042 X (14.87 X 10^6)

$= 0.26 \times 10^{12}$ kcal

and

Total Energy Content, Bog 337

$= (4.63 + 0.26) \times 10^{12}$ kcal

$= 4.89 \times 10^{12}$ kcal

Example 2: Potential Energy Yield, Bog 767

Inventory Data:

Volume = 14.50 million cubic metres

Average Humification (weighted) 5.8

Peat Types - sphagnum 43.7%

- sedge 56.3%

Using equation 10 on Figure 16, the gross calorific value for the sphagnum peats was determined to be 455,470 kcal/m^3. Thus:

Energy Content (sphagnum peats)

$= 455,470 \times .437 \times (14.50 \times 10^6)$

$= 2.89 \times 10^{12}$ kcal

Using equation 8 on Figure 18, the gross calorific value for the sedge peats was determined to be 486,290 kcal/m^3. Thus:

Energy Content (sedge peats)

$= 486,290 \times .563 \times (14.50 \times 10^6)$

$= 3.97 \times 10^{12}$ kcal

and

Total Energy Content, Bog 767

$= (2.89 + 3.97) \times 10^{12}$ kcal

$= 6.86 \times 10^{12}$ kcal

The examples illustrate that while the total volume of Bog 767 is slightly less than the total volume of Bog 337, the potential energy yield of Bog 767 is over 40 percent higher. Using quantitative information such as that shown, the relative merits of mining peats with low energy yields and short transportation distances versus peats with high energy yields and long transportation distances can be readily compared. The relationships documented provide a valuable tool in the comparison and selection of peat mining areas.

SUMMARY

The calorific value of peat has been shown to increase with increasing degree of humification. Sphagnum peats were found to have a greater rate of increase in calorific value with degree of humification than sedge peats. Relationships shown on a weight basis were found to be greatly amplified when compared to those on a volume basis.

The observed relationship between calorific value and degree of humification is in agreement with earlier work by Salmi (1947, 1949, 1954, 1961) and Makila (1980) of the Geological Survey of Finland and results from Newfoundland (Montreal Engineering, 1978). The results shown with sphagnum peats having a greater rate of increase in calorific value relative to degree of humification than sedge peats is in accordance with Makila's results. The coefficient of correlation for ash-free calorific value to humification determined in the present study of 0.6269 for sphagnum peats and 0.2627 for sedge peats are comparable to Makila's results.

Peat composed of Carex, i.e. C-peats, were found to have the highest calorific values whereas those composed primarily of Sphagnum, i.e. S-peats, were found to have the lowest calorific values. Combinations of these two major peat forming materials, i.e. CS- and SC-peats, show some differences from samples composed of only one of the major peat types. These results compare favourably to those

reported by Makila and Salmi.

Subdivision of these four peat type groups were made to investigate the effect of minor peat types such as shrubs (N), wood (L), or Eriophorum (Er). While some small differences were observed, it was concluded that minor peat types have relatively little influence on the relationships shown. However, these minor peat types generally constitute only a small percentage of the total sample.

Salmi (1954) reports peats with wood as a component (L-peats) to have the highest calorific values, but notes his results (means) may be too high since his sample population for this group did not include peats of low degree of humification. The present study indicates that while woody peats have relatively high means, plots of the regression equations show peats with wood to have lower energy contents than was observed for similar peat types not containing wood.

The previous paragraph indicates some of the difficulties which may be encountered in the comparison of calorific values using mean values. The present study has shown that apparent differences in mean calorific value of peat types often reflect sample populations which have different average humifications. Thus comparison using only means can be misleading and a weighting which takes the degree of humification into consideration provides results which are more readily comparable.

Ash content was found to be lower in sphagnum peats than in sedge peats with a low coefficient of correlation in all cases. This is in agreement with the results of both Salmi and Makila. The observations in the present study of highest ash contents in Carex peats or those containing wood probably indicates a strong relationship between ash content and the environment of peat deposition. These peat types commonly occur in environments where water movement such as periodic flooding could deposit mineral sediments with the peat.

Trends shown by comparison of calorific value to humification on a weight basis are further amplified when converted to a volumetric basis. When the volumes of various peat types in a deposit have been determined, the relationships reported can be used to estimate the energy yield of a deposit.

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APPENDICES

APPENDIX I

Data File and Legend of Peat Type Symbols

LEGEND TO PEAT TYPE SYMBOLS

Major Peat Types

S - Sphagnum

C - Carex

B - Bryales

Minor Peat Types

N - Shrubs

L - Wood

Sh - Scheuchzeria

Er - Eriophorum

Pr - Phragmites

Tr - Trichophorum (Scirpus)

Other

Oz - Ooze

Degree of Humification (H)

H1 to H10

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
393	B 800W+	0	20	1	S	2		4763	1.8	4850
393	B 800W+	20	60	2	S	2		4661	0.8	4699
393	B 800W+	60	70	3	S	3		4950	1.3	5015
393	B 800W+	70	100	4	N S	4		4986	0.6	5016
393	B 800W+	100	180	5	S	3		4854	0.3	4869
393	B 800W+	180	200	6	S	4		5081	0.6	5112
393	B 800W+	200	220	7	S	3		4888	0.5	4913
393	B 800W+	220	250	8	N S	4		5092	0.4	5112
393	B 800W+	250	350	9	S	4		5088	0.7	5124
393	B 800W+	350	400	10	N S	6		5746	1.2	5816
393	B 800W+	400	450	11	S	5		4956	1.1	5011
393	B 800W+	450	470	12	S	6		4978	1.8	5069
393	B 800W+	470	480	13	S	4		4876	0.9	4920
393	B 800W+	483	500	14	S	5		4872	1.8	4961
393	B 800W+	500	530	15	S	7		5029	1.8	5121
393	B 800W+	530	600	16	S C	4		5213	0.1	5218
393	B 800W+	600	610	17	B C	3		4964	3.4	5139
134	B 500W+	0	40	1	S	2		4594	4.7	4821
134	B 500W+	40	60	2	S	2		4441	0.9	4481
134	B 500W+	60	80	3	S	3		4471	0.4	4489
134	B 500W+	80	100	4	S	6		4964	1.0	5014
134	B 500W+	100	120	5	S	7		5209	0.7	5246
134	B 500W+	120	150	6	S	5		5169	0.7	5205
134	B 500W+	150	170	7	S	6		5286	0.4	5307
134	B 500W+	170	190	8	C S	6		5520	1.3	5593
134	B 500W+	190	230	9	C S	7		5646	2.3	5779
134	B 500W+	230	270	10	S C	4		5393	2.2	5514
134	B 500W+	270	280	11	C C	4		5304	2.6	5446
778	L 400S+ 100W	0	50	1	N S	3	66	4497	2.7	4622
778	L 400S+ 100W	50	90	2	N S	4	65	4653	1.0	4700
778	L 400S+ 100W	90	100	3	N S	5	117	4999	2.0	5101
778	L 400S+ 100W	100	150	4	N C	4	84	5176	4.4	5414
778	L 400S+ 100W	150	190	5	S S	7	93	5150	3.1	5315
778	L 400S+ 100W	190	200	6	N S	6	88	5139	0.9	5186
778	L 400S+ 100W	200	220	7	N C	4	86	5137	1.5	5215
778	L 400S+ 100W	250	260	9	C	4	83	5503	1.4	5581
778	L 400S+ 100W	260	300	10	C	4	96	5348	3.5	5542
778	L 400S+ 100W	300	330	11	N S	3	79	5011	3.9	5214
778	L 400S+ 100W	330	360	12	N C	3	81	5053	4.3	5280
778	B2000S+	0	50	16	S	2		4451	1.0	4496
778	B2000S+	50	160	17	S	3		4872	1.3	4936
778	B2000S+	160	180	18	ER S	3		4916	1.3	4981
778	B2000S+	180	200	19	ER S	6		4938	1.8	5029
778	B2000S+	200	240	20	ER S	5		5029	1.7	5116
778	B2000S+	240	300	21	S	6		5238	1.2	5302

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
778	B2000S+	300	320	22	N C S	6		5318	2.1	5432
778	B2000S+	320	390	23	S C	5		5589	3.5	5792
778	B2000S+	390	400	24	N C	5		4300	4.6	5136
778	B2000S+	400	420	25	S C	5		4860	5.6	5148
778	B2000S+	420	440	26	N C	4		4913	8.2	5352
778	B2000S+	440	460	27	C	4		4880	4.0	5083
383	L 800E+ 300N	0	20	1	S	3		4468	1.7	4545
383	L 800E+ 300N	20	130	2	S	3		4642	1.4	4708
383	L 800E+ 300N	130	150	3	S	4		4887	1.0	4936
383	L 800E+ 300N	150	200	4	S	5		5283	2.0	5391
383	L 800E+ 300N	200	250	5	N S	5		5158	1.4	5231
383	L 800E+ 300N	250	260	6	S	4		4175	2.2	4269
383	L 800E+ 300N	260	290	7	S	5		5140	1.2	5202
383	L 800E+ 300N	290	300	8	C S	5		5240	1.3	5309
383	L 800E+ 300N	300	330	9	N C S	5		5287	5.3	5583
383	L 800E+ 300N	330	340	10	N C S	6		5469	2.1	5586
383	L 800E+ 300N	340	360	11	N C S	5		5348	1.6	5435
383	L 800E+ 300N	360	400	12	S C	5		4565	4.0	4755
383	L 800E+ 300N	400	420	13	C	4		5232	4.2	5461
383	L 800E+ 300N	420	440	14	C	6		5167	4.6	5416
383	L 800E+ 300N	440	470	15	C	7		4964	11.3	5596
383	L 800E+ 300N	470	520	16	O			4157	25.4	5572
390	B 400E+	0	30	1	S	2		4129	1.7	4200
390	B 400E+	30	70	2	S	2		4625	0.4	4644
390	B 400E+	70	170	3	S	3		4918	0.3	4933
390	B 400E+	170	240	4	S	4		5839	0.1	5845
390	B 400E+	240	250	5	S	3		5071	1.8	5164
390	B 400E+	250	400	6	S	4		5091	0.8	5132
390	B 400E+	400	430	7	S	5		5218	0.6	5249
390	B 400E+	430	450	8	N C S	6		5453	0.7	5491
390	B 400E+	450	470	9	C S	7		5738	1.5	5825
390	B 400E+	470	490	10	C S	6		5454	2.0	5565
390	B 400E+	490	500	11	C S	5		5789	2.0	5907
891	T 2 +	0	40	1	S	2	48	4506	1.3	4565
891	T 2 +	40	80	2	S	2	51	4617	0.9	4659
891	T 2 +	80	100	3	C S	3	72	4822	0.2	4832
891	T 2 +	100	110	4	C S	4	81	4951	2.0	5052
891	T 2 +	110	130	5	SH C S	4	72	4998	1.6	5079
891	T 2 +	130	160	6	C S	4	62	5014	1.2	5075
891	T 2 +	160	230	7	L C S	4	86	4968	1.2	5028
891	T 2 +	230	250	8	L S C	6	88	4793	6.7	5137
891	T 2 +	250	290	9	L S C	7	89	4878	4.5	5108
891	T 2 +	290	320	10	L S C	4	88	4703	5.2	4961
891	T 2 +	320	340	11	L S C	4	89	4523	5.4	4781
891	T 2 +	340	370	12	L S C	6	95	4732	5.7	5018

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	DEPTH (CM) TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
89	2	0	40	13	C S L	4	94	4774	5.0	5025
89	2	40	43	14	C L N	4		4716	7.0	5071
89	2	43	44	15	C L N	4	101	4768	5.1	5024
89	2	44	50	16	C N	4	75	4817	3.3	4981
89	2	50	89	1	C	3		4485	3.3	4638
89	2	89	230	2	C	4		4636	4.6	4655
89	2	230	280	3	C	3		4748	6.7	4696
89	2	280	330	4	C	4		4998	4.1	4781
89	2	330	335	5	C	4		5216	1.1	5069
89	2	335	380	6	C	4		5334	2.1	5274
89	2	380	392	7	C	5		5511	3.4	5399
89	2	392	460	8	C	4		5485	1.1	5584
89	2	460	505	9	C	4		5184	3.4	5563
89	2	505	570	10	C	4		5547	5.0	5629
89	2	570	610	11	C	7		5317	9.5	5476
89	2	610	660	12	C	4		5328	5.9	5532
89	2	660	690	13	C	4		5590	5.9	5562
89	2	690	710	1	C	2		4800	6.6	5102
89	2	710	730	2	C	3		5302	5.1	5259
89	2	730	760	3	C	6		5124	6.7	5669
89	2	760	780	4	C	4		4993	6.3	5310
89	2	780	800	5	C	6		4911	5.1	5259
89	2	800	820	6	C	5		4930	10.2	5892
89	2	820	840	7	C	7		3655	12.6	5484
89	2	840	860	8	C	8		3771	13.0	4759
89	2	860	880	9	O	3		4766	14.2	5031
89	2	880	900	10	S	3		5046	7.7	5053
89	2	900	920	11	S	3		5191	6.9	5066
89	2	920	940	12	S	6		4937	8.4	5043
89	2	940	960	13	S	7		5204	9.5	5020
89	2	960	980	14	S	6		5242	8.7	5059
89	2	980	1000	15	S	5		5260	8.9	5296
89	2	1000	1020	16	S	3		5580	11.6	5316
89	2	1020	1040	17	S	3		5404	11.0	5663
89	2	1040	1060	18	S	3		5630	8.0	5894
89	2	1060	1080	19	S	4		5194	8.3	5773
89	2	1080	1100	20	S	4		4793	7.1	5203
89	2	1100	1150	1	C	4		4938	8.7	4856
89	2	1150	1200	2	C	4		5229	4.0	4988
89	2	1200	1290	3	C	4		4994	1.4	5047
89	2	1290	1300	4	C	4	89	5114	1.0	5055
89	2	1300	1330	5	C	4	74	5164	1.3	5232
89	3	0	40	13	C S L	4	94	4774	5.0	5025
89	3	40	43	14	C L N	4		4716	7.0	5071
89	3	43	44	15	C L N	4	101	4768	5.1	5024
89	3	44	50	16	C N	4	75	4817	3.3	4981
89	3	50	89	1	C	3		4485	3.3	4638
89	3	89	230	2	C	4		4636	4.6	4655
89	3	230	280	3	C	3		4748	6.7	4696
89	3	280	330	4	C	4		4998	4.1	4781
89	3	330	335	5	C	4		5216	1.1	5069
89	3	335	380	6	C	4		5334	2.1	5274
89	3	380	392	7	C	5		5511	3.4	5399
89	3	392	460	8	C	4		5485	1.1	5584
89	3	460	505	9	C	4		5184	3.4	5563
89	3	505	570	10	C	4		5547	5.0	5629
89	3	570	610	11	C	7		5317	9.5	5476
89	3	610	660	12	C	4		5328	5.9	5532
89	3	660	690	13	C	4		5590	5.9	5562
89	3	690	710	1	C	2		4800	6.6	5102
89	3	710	730	2	C	3		5302	5.1	5259
89	3	730	760	3	C	6		5124	6.7	5669
89	3	760	780	4	C	4		4993	6.3	5310
89	3	780	800	5	C	6		4911	5.1	5259
89	3	800	820	6	C	5		4930	10.2	5892
89	3	820	840	7	C	7		3655	12.6	5484
89	3	840	860	8	C	8		3771	13.0	4759
89	3	860	880	9	O	3		4766	14.2	5031
89	3	880	900	10	S	3		5046	7.7	5053
89	3	900	920	11	S	3		5191	6.9	5066
89	3	920	940	12	S	6		4937	8.4	5043
89	3	940	960	13	S	7		5204	9.5	5020
89	3	960	980	14	S	6		5242	8.7	5059
89	3	980	1000	15	S	5		5260	8.9	5296
89	3	1000	1020	16	S	3		5580	11.6	5316
89	3	1020	1040	17	S	3		5404	11.0	5663
89	3	1040	1060	18	S	3		5630	8.0	5894
89	3	1060	1080	19	S	4		5194	8.3	5773
89	3	1080	1100	20	S	4		4793	7.1	5203
89	3	1100	1150	1	C	4		4938	8.7	4856
89	3	1150	1200	2	C	4		5229	4.0	4988
89	3	1200	1290	3	C	4		4994	1.4	5047
89	3	1290	1300	4	C	4	89	5114	1.0	5055
89	3	1300	1330	5	C	4	74	5164	1.3	5232

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
381	B 900W+	300	320	9	S C	4	85	5251	3.9	5464
381	B 900W+	320	350	10	N C	3	84	5135	1.3	5203
381	B 900W+	350	360	11	B C	4	69	4956	2.1	4960
804	B 400N+	0	50	2	S	3	57	4604	2.2	4708
804	B 400N+	50	70	3	S	3	63	4713	1.8	4799
804	B 400N+	70	80	4	S	4	93	5049	6.1	5377
804	B 400N+	80	90	5	S	6	102	5552	1.5	5637
804	B 400N+	90	170	6	C S	7	91	5219	1.4	5293
804	B 400N+	170	190	7	L C S	7	96	5465	1.9	5571
804	B 400N+	190	200	8	C S	7	104	5596	3.6	5805
804	B 400N+	200	220	9	C S	6	104	5603	4.6	5873
804	B 400N+	220	240	10	N S C	4	86	5428	2.3	5556
804	B 400N+	240	250	11	S C	4	103	4958	5.4	5241
804	B 400N+	250	270	12	N S C	4	75	5456	4.2	5695
804	B 400N+	270	330	13	S C	4	80	5209	5.7	5524
804	B 400N+	330	370	14	O Z		99	3976	26.1	5380
45	B 800E+	0	30	1	S	3		4573	2.1	4671
45	B 800E+	30	50	2	S	3		4639	0.4	4658
45	B 800E+	50	320	3	S	3		4709	5.4	4978
45	B 800E+	320	340	4	ER S	3		5021	0.6	5051
45	B 800E+	340	350	5	S	3		4731	1.4	4798
45	B 800E+	350	370	6	C S	5		5153	1.1	5210
45	B 800E+	370	390	7	N C S	5		5276	2.3	5400
45	B 800E+	390	400	8	C S	4		5007	1.9	5104
45	B 800E+	400	440	9	S C	4		5313	2.8	5466
45	B 800E+	440	450	10	S C	6		5207	5.6	5516
45	B 800E+	450	470	11	S C	4		5938	4.9	6244
45	B 800E+	470	490	12	L S C	5		5084	6.7	5449
45	B 800E+	490	520	13	L S C	7		5269	10.8	5907
45	B 800E+	520	530	14	C	4		5323	6.6	5699
32	B 500W+	0	10	1	S	1	15	4567	1.3	4627
32	B 500W+	10	50	2	N S	2	40	4495	1.8	4577
32	B 500W+	50	90	3	S	3	53	4767	8.0	5182
32	B 500W+	100	120	5	S	3	70	4887	0.4	4907
32	B 500W+	120	130	6	ER N S	6	75	5211	0.1	5216
32	B 500W+	130	160	7	N C S	7	73	5456	0.8	5500
32	B 500W+	160	180	8	N C S	6	102	5550	0.9	5600
32	B 500W+	180	200	9	N S C	7	78	5570	0.9	5621
32	B 500W+	200	230	10	N S C	5	65	5439	1.0	5494
32	B 500W+	260	280	12	N C	7	70	5503	1.6	5592
32	B 500W+	280	320	13	N C	4	67	5248	1.5	5328
32	B 500W+	320	390	14	C	8	110	3511	32.9	5232
47	B1600N+	0	10	1	S	1		4486	2.5	4601
47	B1600N+	10	60	2	S	3	22	4681	2.5	4801
47	B1600N+	60	180	3	C S	4	55	5059	9.9	5615

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	APCV CAL/G
47	B1600N+	180	220	4	S C	4	88	5184	0.2	5194
47	B1600N+	220	240	5	S C	7	100	4814	6.3	5138
47	B1600N+	240	280	6	N C	4	66	5687	3.7	5906
47	B1600N+	280	310	7	C	8	113	5209	8.7	5705
47	B1600N+	310	330	8	C	5	74	5098	4.5	5338
47	B1600N+	330	400	9	C	8	131	5039	31.5	7356
434	F 700E+	0	10	1	S	2		4584	1.4	4649
434	F 700E+	10	20	2	S	3	59	4595	2.2	4698
434	F 700E+	20	70	3	C S	6	115	5256	1.2	5320
434	F 700E+	70	80	4	C S	4	84	5234	0.7	5271
434	F 700E+	80	120	5	C S	7	97	5414	1.0	5469
434	F 700E+	120	210	6	C S	5	99	5525	2.0	5638
434	F 700E+	210	300	7	C	4	100	5162	1.7	5251
434	B1700N+	0	10	8	S	2		4845	1.5	4919
434	B1700N+	10	40	9	S	3	46	4584	1.2	4640
434	B1700N+	40	80	10	S	4	81	4767	0.7	4801
434	B1700N+	80	90	11	S	5	78	4678	3.1	4828
434	B1700N+	90	120	12	S	3	59	4650	0.4	4669
434	B1700N+	120	150	13	S	4	84	4711	0.5	4735
434	B1700N+	150	170	14	S	3	64	4881	0.6	4910
434	B1700N+	170	220	15	N S	6	117	4836	0.8	4875
434	B1700N+	220	230	16	N S	4	86	5228	0.7	5265
434	B1700N+	230	270	17	N S	6	55	5028	0.8	5069
434	B1700N+	280	350	19	C S	5	98	5267	1.9	5369
434	B1700N+	350	390	20	C S	6	111	5512	0.9	5562
434	B1700N+	390	410	21	C	5	110	5448	2.1	5565
434	B1700N+	410	420	22	C	4	123	5267	1.6	5353
440	B 700S+	0	70	2	S	4	60	4973	0.6	4902
440	B 700S+	70	100	3	S	7	97	5009	0.9	5054
440	B 700S+	100	150	4	S	5	83	5059	0.6	5090
440	B 700S+	150	230	5	S	4	69	5012	0.8	5052
440	B 700S+	230	300	6	N S	4	77	4967	1.1	5022
440	B 700S+	300	320	7	S	6	69	5181	1.3	5249
440	B 700S+	320	400	8	C S	7	85	5164	3.0	5324
440	B 700S+	400	420	9	C N	4	111	4931	2.3	5047
660	B 700S+	0	90	1	C S	3	52	4614	1.2	4670
660	B 700S+	90	100	2	S	3	76	4784	0.3	4798
660	B 700S+	100	250	3	ER S	3	58	4750	8.0	5163
660	B 700S+	250	400	4	S	3	65	4914	0.5	4939
660	B 700S+	400	430	5	S	7	72	4256	2.3	4356
660	B 700S+	430	450	6	S	7	128	5395	3.1	5568
660	B 700S+	450	530	7	C S	5	116	5120	5.2	5401
660	B 700S+	530	540	8	C	4		5250	4.2	5480
731	B1100S+	0	170	1	S	3	63	4711	0.9	4754
731	B1100S+	170	200	2	S	4	64	4834	0.7	4868

BCG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
731	B1100S+	200	240	3	S	3	67	4611	0.8	4648
731	B1100S+	240	260	4	S	6	82	4912	1.2	4972
731	B1100S+	260	340	5	S	4	73	4903	1.2	4963
731	B1100S+	340	370	6	NER S	6	55	5192	1.4	5266
731	B1100S+	370	400	7	N C	4	100	5353	1.9	5457
731	B1100S+	400	450	8	N S C	5	89	5453	7.2	5876
731	B1100S+	450	530	9	N C	5	90	5320	7.6	5758
731	B1100S+	530	550	10	OZ		94	4639	17.1	5596
736	B 600N+	0	80	1	S	3	75	4798	0.9	4842
736	B 600N+	80	100	2	S	7	111	5278	1.2	5342
736	B 600N+	100	130	3	S	3	78	5000	1.3	5066
736	B 600N+	130	150	4	S	5	106	5314	1.3	5384
736	B 600N+	150	210	5	S	7	81	5364	1.7	5457
736	B 600N+	210	250	6	N S	7	86	5448	1.7	5542
736	B 600N+	250	270	7	N C S	6	110	5467	2.2	5590
736	B 600N+	270	310	8	N C	4	82	5381	3.1	5553
737	B1200N+	0	130	1	S	2	30	4678	0.9	4720
737	B1200N+	150	200	3	S	7	46	5292	0.7	5329
737	B1200N+	230	250	5	N S	4	59	5806	0.6	5841
737	B1200N+	250	300	6	N S	7	66	5712	1.7	5811
737	B1200N+	300	350	7	NSH S	4	60	5759	0.8	5805
737	B1200N+	350	390	8	N S	7	87	5817	1.3	5894
737	B1200N+	400	490	10	SH C	4	31	5450	3.0	5619
737	B1200N+	500	550	12	OZ		46	5250	16.5	6287
737	B1200N+	550	610	13	OZ		57	3842	35.2	5929
737	B1200N+	610	630	14	OZ		56	3028	34.6	4630
758 A	B 400N+	0	50	1	S	3	59	4714	0.9	4757
758 A	B 400N+	50	150	2	S	3	57	4786	1.2	4844
758 A	B 400N+	150	200	3	N S	7	89	5148	1.6	5232
758 A	B 400N+	200	250	4	L S	8	104	5328	1.8	5426
758 A	B 400N+	250	300	5	NSH C	4	97	5925	4.0	6172
758 A	B 400N+	330	370	7	N C	4	85	5295	17.3	6403
758 A	B 400N+	370	420	8	OZ		161	2831	45.3	5176
765	L 700N+ 200W	0	20	1	S	2	36	4509	1.7	4587
765	L 700N+ 200W	20	70	2	S	3		4659	1.0	4706
765	L 700N+ 200W	70	200	3	S	4	46	4620	0.9	4662
765	L 700N+ 200W	200	250	4	S	3	65	4748	0.8	4786
765	L 700N+ 200W	250	300	5	N S	5	78	4981	1.2	5041
765	L 700N+ 200W	300	330	6	S	4	66	4781	1.4	4849
765	L 700N+ 200W	330	350	7	N S	5	86	5195	1.9	5296
765	L 700N+ 200W	350	400	8	N S	4	80	5209	2.2	5326
765	L 700N+ 200W	400	470	9	N S	6	71	4984	3.7	5175
765	L 700N+ 200W	470	520	10	N S	4	71	5120	3.4	5300
765	L 700N+ 200W	520	570	11	C	4	69	5398	3.4	5588
767	F 900N+	0	10	1	S	3	72	4506	5.9	4789

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
767	F 900N+	10	20	2	N S	4	91	5117	3.6	5308
767	F 900N+	20	50	3	S	6	123	5187	2.7	5331
767	F 900N+	50	80	4	S	8	126	5537	3.0	5708
767	F 900N+	80	100	5	C S	7	144	5520	7.9	5993
767	F 900N+	100	110	6	S	7	121	5262	1.3	5331
767	F 900N+	110	130	7	S C	4	77	5500	1.9	5607
767	F 900N+	130	150	8	N S	4	81	5414	1.5	5496
767	F 900N+	150	190	9	S C	4	90	5464	8.4	5965
767	F 900N+	190	230	10	C	7	126	5023	27.5	6928
767	F 900N+	230	250	11	O Z		76	4145	27.9	5749
767	B2500N+	0	20	16	N S	2	20	4978	4.0	5185
767	B2500N+	20	50	17	S	5	74	5184	7.0	5574
767	B2500N+	50	90	18	S	6	99	5564	8.6	6088
767	B2500N+	90	150	19	L S	5	97	5337	3.5	5531
767	B2500N+	150	200	21	N L S	6	95	4934	5.2	5205
767	B2500N+	200	240	22	S C	7	133	4984	7.7	5400
767	B2500N+	240	250	23	C	6	120	5203	13.3	6001
767	B2500N+	250	280	24	C	6	111	5056	13.1	5818
767	B2500N+	280	350	25	C	7	103	4850	13.4	5600
770	L 600W+ 100S	10	50	2	L S	4	89	4578	6.6	4901
770	L 600W+ 100S	50	80	3	L S	4	87	4789	5.7	5078
770	L 600W+ 100S	80	180	4	L S	7	142	4603	10.5	5143
770	L 600W+ 100S	180	200	5	L C S	6	115	4592	7.9	4986
770	L 600W+ 100S	200	210	6	L S C	5	108	4695	7.3	5065
770	L 600W+ 100S	210	240	7	C	4	90	5067	6.7	5431
773	B1600S+	0	40	1	S	3	54	4686	1.2	4743
773	B1600S+	40	50	2	S	6	89	4970	0.7	5005
773	B1600S+	50	70	3	N S	5	79	4767	0.6	4796
773	B1600S+	70	90	4	S	3	67	4814	0.1	4819
773	B1600S+	90	100	5	S	6	78	5039	0.4	5059
773	B1600S+	100	120	6	S	4	62	4667	0.6	4695
773	B1600S+	120	140	7	N S	6	78	5131	0.9	5178
773	B1600S+	140	150	8	ER N S	7	61	5170	1.2	5233
773	B1600S+	150	200	9	S	6	69	5137	1.5	5215
773	B1600S+	200	230	10	S	7	83	5412	2.4	5545
773	B1600S+	230	250	11	C S	7	76	5342	2.1	5457
773	B1600S+	250	280	12	S	7	65	5192	3.6	5386
773	B1600S+	280	300	13	L S	6	95	5075	6.4	5422
773	B1600S+	300	360	14	L N S	7	76	3711	6.5	3969
773	B1600S+	360	400	15	C	4	82	5048	4.1	5264
773	B1600S+	400	420	16	C	4	75	5264	3.6	5461
773	B1600S+	420	450	17	N C	4	87	4386	5.5	4641
773	B1600S+	450	460	18	C	4	80	5131	3.1	5295
785	B 800N+	0	10	12	S	2	25	4484	1.1	4534
785	B 800N+	10	50	13	S	3	62	4770	1.7	4852

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
785	B 800N+	50	100	14	S	4	85	3984	0.6	3907
785	B 800N+	100	170	15	S	3	73	4689	0.6	4717
785	B 800N+	170	250	16	N S	6	82	5262	0.9	5310
785	B 800N+	250	300	17	S	7	88	5328	1.3	5398
785	B 800N+	300	340	18	S	6	89	5262	1.8	5358
785	B 800N+	340	400	19	S C	4	86	5056	2.7	5196
785	B 800N+	400	470	20	C	4	84	5145	3.2	5315
785	L1000N+ 100W	0	50	1	S	2	21	4375	0.6	4401
785	L1000N+ 100W	50	140	2	S	3	54	4717	0.8	4755
785	L1000N+ 100W	140	160	3	S	7	65	5214	1.5	5293
785	L1000N+ 100W	160	200	4	N S C	4	97	5412	1.9	5517
785	L1000N+ 100W	200	250	5	PR L S	7	82	5314	0.1	5319
785	L1000N+ 100W	250	350	6	PR L C	6	101	5164	6.4	5517
785	L1000N+ 100W	350	380	7	L N C	4	101	5162	8.2	5623
785	L1000N+ 100W	380	410	8	N C	6	96	5159	7.3	5565
785	L1000N+ 100W	410	420	9	C	4	70	4767	5.7	5055
785	L1000N+ 100W	420	440	10	C	6	80	4973	8.3	5423
792	B1400S+	0	70	1	S	2	44	4331	3.2	4474
792	B1400S+	70	90	2	S C	3	94	4889	14.3	5705
792	B1400S+	90	100	3	C S	5	92	5175	6.3	5523
792	B1400S+	100	130	4	C S	7	88	5245	2.4	5374
792	B1400S+	150	330	6	N C S	4	72	5073	2.4	5198
792	B1400S+	330	350	7	S C	4	53	4892	2.5	5017
792	B1400S+	350	420	8	OZ		85	3431	34.7	5254
811	B 500S+	10	40	2	N S	3	79	4867	2.4	4987
811	B 500S+	50	190	4	S	3	73	4884	0.5	4909
811	B 500S+	190	220	5	S	4	81	5084	0.5	5110
811	B 500S+	220	250	6	S	5	91	5187	0.7	5224
811	B 500S+	250	290	7	ER N S	5	67	5089	0.9	5135
811	B 500S+	290	350	8	S	4	81	5228	1.5	5308
811	B 500S+	350	360	9	S C	6	96	5228	1.3	5297
811	B 500S+	360	390	10	N S C	7	112	5681	1.8	5785
811	B 500S+	390	400	11	S C	6	85	5439	1.9	5544
811	B 500S+	400	440	12	N C	4	90	5589	2.2	5715
813	B 600S+	0	20	1	S	2	28	4534	1.4	4598
813	B 600S+	20	60	2	S	3	67	4553	1.6	4627
813	B 600S+	60	70	4	S	4	70	4825	0.9	4869
813	B 600S+	70	130	5	S	7	108	5428	1.8	5527
813	B 600S+	130	150	6	N S	7	107	5445	1.2	5511
813	B 600S+	150	180	7	S	7	115	5703	2.0	5819
813	B 600S+	180	200	8	N C S	7	119	5631	2.3	5764
813	B 600S+	200	220	9	S C	4	110	4920	2.5	4944
813	B 600S+	220	250	10	C	4	87	5056	3.2	5223
815	L 500N+ 100E	0	20	1	S	2	36	4320	2.1	4923
815	L 500N+ 100E	20	50	2	S	3		4584	1.1	4635

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
815	L 500N+ 100E	70	130	5	S	7	117	5492	1.9	5598
815	L 500N+ 100E	130	150	6	N C S	7	105	4817	2.0	4915
815	L 500N+ 100E	160	190	8	S C	4	95	5153	3.0	5312
815	L 500N+ 100E	190	240	9	N C	4	74	3359	5.4	3551
815	L 500N+ 100E	250	290	11	S C	3	51	4764	4.3	4978
7	L 100S+ 500W	0	20	1	N S	1		4564	2.16	4665
7	L 100S+ 500W	20	50	3	N S	2		4459	0.96	4502
7	L 100S+ 500W	50	110	5	N S	6		4503	0.66	4533
7	L 100S+ 500W	110	160	7	N C S	8		5359	1.13	5420
7	L 100S+ 500W	160	220	9	N S C	6		3934	10.02	4372
7	L 100S+ 500W	220	260	11	N S C	7		3134	39.59	5188
9	G 500E+ 600S	0	20	1	S S	1		4189	1.10	4236
9	G 500E+ 600S	20	50	3	S S	2		4220	0.31	4233
9	G 500E+ 600S	100	150	7	L S S	7		5637	1.41	5718
9	G 500E+ 600S	150	210	9	L S S	7		5309	2.57	5449
9	G 500E+ 600S	210	280	11	L S C	5		5137	6.67	5504
9	G 500E+ 600S	280	350	13	L S C	6		4831	5.59	5117
9	L 300W+ 200S	0	30	1	S S	1		3884	0.39	3899
9	L 300W+ 200S	30	50	3	E R S	6		3848	1.29	3898
9	L 300W+ 200S	50	70	5	C S	6		4731	0.43	4751
9	L 300W+ 200S	70	110	7	S S	4		4606	0.36	4623
9	L 300W+ 200S	110	180	9	N S S	4		4734	0.59	4762
9	L 300W+ 200S	180	240	11	N S C	7		5326	1.77	5422
9	L 300W+ 200S	240	280	13	N C	4		5134	1.42	5208
9	L 300W+ 200S	280	320	15	C C	8		4556	17.60	5529
11	B1700S+	0	30	1	S S	1		4414	1.19	4467
11	B1700S+	30	50	3	S S	2		4773	1.36	4839
11	B1700S+	50	70	5	S S	3		4623	1.93	4714
11	B1700S+	70	130	7	S S	5		5198	2.33	5322
11	B1700S+	130	200	9	N S C	7		5705	1.88	5814
13	L 400S+ 300E	0	30	1	N S	1		4053	1.98	4135
13	L 400S+ 300E	30	50	3	E B S	2		4745	1.92	4838
13	L 400S+ 300E	50	100	5	S S	7		5312	3.77	5520
13	L 400S+ 300E	100	130	7	N C S	7		3545	3.34	3667
13	L 400S+ 300E	130	170	9	N C S	4		5323	3.29	5504
13	L 400S+ 300E	170	210	11	N N C	4		5015	4.27	5239
13	L 400S+ 300E	210	270	13	L S C	7		5192	11.02	5835
13	L 400S+ 300E	270	310	15	S C	6		4056	24.48	5371
13	L 400S+ 300E	310	350	17	N C			1239	78.91	5875
14	B1700E+	0	30	1	O 2 S	1		4295	0.92	4335
14	B1700E+	30	50	3	S S	2		4453	0.88	4493
14	B1700E+	50	100	5	N S	4		4920	1.02	4971
14	B1700E+	100	150	7	S S	6		5420	1.76	5517
14	B1700E+	150	200	9	N C S	5		5284	3.71	5488
14	B1700E+	200	260	11	L C S	6		5273	4.30	5510

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
14	B1700E+	260	310	13	L S C	9		3120	48.89	6104
14	L 600E+ 200N	0	30	15	N S	2		4467	1.24	4523
14	L 600E+ 200N	30	50	17	N S	3		4667	0.80	4705
14	L 600E+ 200N	50	120	19	S	4		4828	0.98	4876
14	L 600E+ 200N	120	170	21	C S	5		5281	0.79	5323
14	L 600E+ 200N	170	200	23	C S	8		6223	1.07	6290
14	L 600E+ 200N	200	250	25	C S	8		6209	5.38	6562
14	L 600E+ 200N	250	300	27	C	4		5542	4.52	5804
16	F 400W+	0	20	1	N S	1		4176	1.80	4253
16	F 400W+	20	50	3	S	2		3978	0.90	4014
16	F 400W+	50	100	5	S	3		4392	0.78	4427
16	F 400W+	100	150	7	N S	4		4920	1.00	4970
16	F 400W+	150	220	9	C S	7		5587	2.18	5712
16	F 400W+	220	270	11	N C	4		5337	2.96	5500
16	F 400W+	270	330	13	S C	8		4053	28.94	5704
17	L 900N+ 300W	0	30	1	S	1		4037	4.45	4225
17	L 900N+ 300W	30	50	3	S	2		4217	2.31	4317
17	L 900N+ 300W	50	120	5	S	6		4287	2.89	4414
17	L 900N+ 300W	120	170	7	C S	8		5203	2.26	5323
17	L 900N+ 300W	170	200	9	C S	7		5665	2.71	5823
17	L 900N+ 300W	200	240	11	N C	5		5231	8.29	5704
17	L 900N+ 300W	240	290	13	S C	7		5228	22.86	6777
17 A	B1200E+	0	30	1	S	1		4156	1.57	4222
17 A	B1200E+	30	50	3	S	2		4178	0.78	4211
17 A	B1200E+	50	90	5	S	3		4192	0.67	4220
17 A	B1200E+	90	150	7	N C S	7		5223	2.14	5337
17 A	B1200E+	150	190	9	C	4		5401	1.31	5473
17 A	B1200E+	190	250	11	L S C	5		5301	4.45	5548
17 A	B1200E+	250	320	13	N C	4		5142	4.28	5372
17 A	B1200E+	320	350	15	S C	8		3589	15.70	4257
22	L 600E+ 200S	0	30	1	ER S	1		4264	1.00	4307
22	L 600E+ 200S	30	50	3	NER S	2		4815	1.47	4887
22	L 600E+ 200S	50	80	5	N S	3		4536	0.42	4555
22	L 600E+ 200S	80	100	7	N S	5		4853	0.89	4897
22	L 600E+ 200S	100	130	9	N S	4		4645	0.62	4674
22	L 600E+ 200S	130	200	11	N S	6		4962	1.92	5059
22	L 600E+ 200S	200	250	13	N S	6		4951	1.31	5017
22	L 600E+ 200S	250	300	15	N S	8		4956	18.87	6109
22	L 600E+ 200S	300	350	17	N S	9		3242	40.39	5439
24	B 100S+	0	30	1	ER S	1		4192	1.47	4255
24	B 100S+	30	50	3	S	2		3603	1.29	3650
24	B 100S+	50	100	5	C S	8		5806	3.66	6027
24	B 100S+	100	150	7	S C	5		5367	2.46	5502
24	B 100S+	150	200	9	C	4		4637	3.59	4809
25	L 800E+ 800N	0	30	1	ER S	3		3973	13.32	4584

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
25	L 800E+ 800N	30	50	3	N C S	5		5237	6.97	5629
25	L 800E+ 800N	50	90	5	N N S	7		5295	4.83	5564
25	L 800E+ 800N	90	130	7	N N C	5		5073	5.12	5347
25	L 800E+ 800N	130	170	9	N L C	5		5278	6.69	5656
25	L 800E+ 800N	170	230	11	N C	5		4912	7.95	5336
25	L 800E+ 800N	230	290	13	N N C	5		5015	7.36	5413
25	L 800E+ 800N	290	350	15	N N C	6		4395	22.35	5660
25	L 800E+ 800N	350	380	17	N N C	8		3448	42.80	6028
25	B2100E+	0	30	19	S	1		4356	1.27	4412
25	B2100E+	30	50	21	S	2		4453	0.77	4488
25	B2100E+	50	90	23	S	3		4548	1.15	4601
25	B2100E+	90	150	25	N S	7		5084	0.99	5135
25	B2100E+	150	210	27	N S	5		4994	1.02	5045
25	B2100E+	210	270	29	N S C	7		5634	2.15	5758
25	B2100E+	270	300	31	N S C	6		5587	4.65	5859
25	B2100E+	300	340	33	N C	4		5303	3.36	5487
25	B2100E+	340	390	35	C	4		4251	33.15	6359
27	L1600N+ 200E	0	30	1	T B S	1		4095	1.35	4151
27	L1600N+ 200E	30	50	3	T R S	2		4256	1.01	4299
27	L1600N+ 200E	50	80	5	T R S	3		4198	0.59	4223
27	L1600N+ 200E	80	130	7	W S	4		4756	0.73	4791
27	L1600N+ 200E	130	190	9	N S	5		4648	0.80	4685
27	L1600N+ 200E	190	260	11	S	5		4626	0.79	4663
27	L1600N+ 200E	260	310	13	N S	8		4998	4.46	5231
27	L1600N+ 200E	310	350	15	N C S	8		6079	6.57	6506
27	L1600N+ 200E	350	420	17	C	4		5037	10.42	5623
28	L1000E+ 200N	0	30	1	S	1		4270	1.73	4345
28	L1000E+ 200N	30	50	3	S	2		4523	1.31	4583
28	L1000E+ 200N	50	110	5	N S	5		4817	1.63	4897
28	L1000E+ 200N	110	150	7	N S	5		4890	1.72	4976
28	L1000E+ 200N	150	230	9	N S C	4		4890	1.90	4985
28	L1000E+ 200N	230	280	11	S C	8		5362	8.36	5851
28	L1000E+ 200N	280	320	13	N S C	6		4501	9.92	4997
29	B1900N+	0	30	1	S	1		4576	1.29	4636
29	B1900N+	30	50	3	N S	2		4617	0.80	4654
29	B1900N+	50	110	5	N S	5		5020	1.01	5071
29	B1900N+	110	140	7	N C S	4		4831	1.10	4885
29	B1900N+	140	190	9	N S C	5		5548	2.01	5662
29	B1900N+	190	230	11	N S C	6		5226	10.62	5847
29	B1900N+	230	280	13	N S C	8		3803	32.02	5594
29	B1900N+	280	340	15	N S	9		2898	47.95	5568
36	B 500N+	0	30	1	C	3		4623	1.03	4671
36	B 500N+	30	50	3	S	5		4659	0.75	4694
36	B 500N+	50	110	5	N S	8		5187	0.95	5237
36	B 500N+	110	140	7	N S	8		5614	0.87	5663

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	APCV CAL/G
36	B 500N+	140	180	9	C	4		5834	1.19	5904
36	B 500N+	180	220	11	N C	4		5431	1.75	5528
36	B 500N+	220	280	13	N C	6		4450	20.96	5630
38	B1600N+	0	30	1	N S	1		4484	1.60	4557
38	B1600N+	30	50	3	N S	2		4559	1.13	4611
38	B1600N+	50	110	5	S	4		4753	0.70	4787
38	B1600N+	110	140	7	N S	4		4573	0.76	4608
38	B1600N+	140	190	9	N S	7		5462	1.96	5571
38	B1600N+	190	230	11	N S	8		4825	2.11	4929
38	B1600N+	230	270	13	N C	4		4106	19.97	5131
41	B 600N+	0	30	9	S	1		4126	1.21	4177
41	B 600N+	30	50	11	S	2		4378	0.84	4415
41	B 600N+	50	90	13	S	2		4442	0.28	4454
41	B 600N+	90	160	15	S	3		4559	0.38	4576
41	B 600N+	160	230	17	S	3		4759	0.71	4793
41	B 600N+	230	270	19	N S	4		4778	0.83	4818
41	B 600N+	270	320	21	S C	8		5695	12.76	6528
41	B 600N+	320	370	23	S C	8		2306	28.84	3241
54	B1100S+	0	30	1	N S	2		4450	1.59	4522
54	B1100S+	30	50	3	N S	2		4389	1.05	4436
54	B1100S+	50	100	5	N S	4		4670	0.84	4710
54	B1100S+	100	170	7	N S	4		4592	0.70	4624
54	B1100S+	170	230	9	S	3		4523	0.99	4568
54	B1100S+	230	290	11	N S	6		5164	1.57	5246
54	B1100S+	290	340	13	N C	5		5428	7.43	5864
54	B1100S+	340	390	15	N C	6		5217	10.76	5846
54	B1100S+	390	460	17	N S C	7		5053	14.59	5916
57	B 400W+	0	30	1	S	2		4748	1.79	4835
57	B 400W+	30	50	3	N S	4		4817	0.90	4861
57	B 400W+	50	100	5	S	3		4828	0.57	4856
57	B 400W+	100	150	7	N S	7		5173	0.89	5219
57	B 400W+	150	200	9	N S	6		5023	0.82	5065
57	B 400W+	200	250	11	N S	6		4975	1.25	5039
57	B 400W+	250	300	13	N S	5		5209	1.40	5283
57	B 400W+	300	360	15	N S	5		5345	2.00	5454
57	B 400W+	360	390	17	N C	5		4914	12.08	5589
57	B 400W+	390	430	19	O Z			2545	55.98	5781
58	B 800W+	0	30	13	S	2		4379	2.4	4487
58	B 800W+	30	50	15	S	3		4441	1.9	4527
58	B 800W+	50	110	17	N S	4		4802	1.1	4855
58	B 800W+	110	170	19	N S	4		4654	0.6	4682
58	B 800W+	170	230	21	N S	5		4791	1.0	4839
58	B 800W+	230	290	23	N S	5		4763	1.7	4845
58	B 800W+	290	330	25	N S	5		5090	2.3	5210
58	B 800W+	330	360	27	N C	5		2072	17.88	2521

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	APCV CAL/G
58	BE	0	41	29	SO	6		4323	3.6	4484
58	BE	41	43	31	SO			4166	48.9	3260
58	BE	0	5	1	SO	1		4839	1.8	5488
58	BE	5	11	3	SO	6		4673	17.6	5061
58	BE	11	16	5	SO	4		4956	4.2	5171
58	BE	16	19	7	SO	9		4729	15.6	5193
58	BE	19	24	9	SO			2165	23.4	6889
58	BE	0	30	11	SO	1		4553	26.6	4757
58	BE	30	36	12	SO	2		4664	5.4	4645
58	BE	0	10	13	SO	4		4984	1.2	4767
58	BE	10	16	15	SO	8		5062	2.2	5125
58	BE	16	22	17	SO	6		5044	2.7	5231
58	BE	22	26	19	SO	9		5081	7.8	5516
58	BE	26	31	21	SO	6		4998	7.6	5325
58	BE	31	36	23	SO	5		5062	5.0	5599
58	BE	0	5	25	SO	7		4981	3.0	5463
58	BE	5	11	27	SO	4		4844	8.8	5557
58	BE	11	16	29	SO	7		4862	7.1	5234
58	BE	16	21	31	SO	4		4750	9.7	5308
58	BE	21	26	33	SO	7		4926	3.2	5407
58	BE	26	31	35	SO	4		4621	9.7	5911
58	BE	31	36	37	SO	7		4266	3.7	4655
58	BE	0	5	39	SO	1		4424	7.7	5263
58	BE	5	11	41	SO	2		4550	9.9	5140
58	BE	11	16	43	SO	4		4269	7.8	5591
58	BE	16	21	45	SO	5		4609	3.3	5102
58	BE	21	26	47	SO	5		4595	3.0	5258
58	BE	26	31	49	SO	8		4783	3.8	5674
58	BE	31	36	51	SO	7		4830	3.7	5344
58	BE	0	5	53	SO	1		4397	7.7	5405
58	BE	5	11	55	SO	2		4269	9.9	5156
58	BE	11	16	57	SO	4		4550	7.8	5284
58	BE	16	21	59	SO	5		4609	3.3	5935
58	BE	21	26	61	SO	5		4595	3.0	5761
58	BE	26	31	63	SO	8		4783	3.8	5733
58	BE	31	36	65	SO	7		4830	3.7	5506
58	BE	0	5	67	SO	1		4397	7.7	5135
58	BE	5	11	69	SO	2		4269	9.9	5133
58	BE	11	16	71	SO	4		4550	7.8	5110
58	BE	16	21	73	SO	5		4609	3.3	5323
58	BE	21	26	75	SO	5		4595	3.0	5733
58	BE	26	31	77	SO	8		4783	3.8	5506
58	BE	31	36	79	SO	7		4830	3.7	5135
58	BE	0	5	81	SO	1		4397	7.7	5133
58	BE	5	11	83	SO	2		4269	9.9	5110
58	BE	11	16	85	SO	4		4550	7.8	5323
58	BE	16	21	87	SO	5		4609	3.3	5733
58	BE	21	26	89	SO	5		4595	3.0	5506
58	BE	26	31	91	SO	8		4783	3.8	5135
58	BE	31	36	93	SO	7		4830	3.7	5133
58	BE	0	5	95	SO	1		4397	7.7	5110
58	BE	5	11	97	SO	2		4269	9.9	5323
58	BE	11	16	99	SO	4		4550	7.8	5733
58	BE	16	21	101	SO	5		4609	3.3	5506
58	BE	21	26	103	SO	5		4595	3.0	5135
58	BE	26	31	105	SO	8		4783	3.8	5133
58	BE	31	36	107	SO	7		4830	3.7	5110
58	BE	0	5	109	SO	1		4397	7.7	5323
58	BE	5	11	111	SO	2		4269	9.9	5733
58	BE	11	16	113	SO	4		4550	7.8	5506
58	BE	16	21	115	SO	5		4609	3.3	5135
58	BE	21	26	117	SO	5		4595	3.0	5133
58	BE	26	31	119	SO	8		4783	3.8	5110
58	BE	31	36	121	SO	7		4830	3.7	5323
58	BE	0	5	123	SO	1		4397	7.7	5733
58	BE	5	11	125	SO	2		4269	9.9	5506
58	BE	11	16	127	SO	4		4550	7.8	5135
58	BE	16	21	129	SO	5		4609	3.3	5133
58	BE	21	26	131	SO	5		4595	3.0	5110
58	BE	26	31	133	SO	8		4783	3.8	5323
58	BE	31	36	135	SO	7		4830	3.7	5733

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	APCV CAL/G
242	F 400N+	250	310	27	N C	5		5337	2.29	5462
242	F 400N+	310	380	29	N C	8		3537	27.02	4847
245	B1100N+	0	30	1	N S	2		4703	3.62	4880
245	B1100N+	30	50	3	S	2		4445	1.12	4495
245	B1100N+	50	110	5	S	4		5031	1.20	5092
245	B1100N+	110	160	7	S	5		5378	2.18	5498
245	B1100N+	160	230	9	L S	7		4964	12.24	5656
271	B1100W+	0	30	1	N S	1		4498	1.2	4553
271	B1100W+	30	50	3	S	2		4439	0.5	4461
271	B1100W+	50	110	5	S	2		4456	0.3	4469
271	B1100W+	110	170	7	N S	7		5003	0.7	5038
271	B1100W+	170	230	9	N S	5		4765	0.6	4794
271	B1100W+	230	290	11	N S	6		4712	0.7	4745
271	B1100W+	290	350	13	N S C	7		5251	4.20	5481
271	B1100W+	350	410	15	N N C	5		5390	6.30	5752
271	B1100W+	410	470	17	C S	4		4870	5.88	5174
324 E	L2600W+ 600S	0	10	1	N S	1		4276	2.00	4363
324 E	L2600W+ 600S	10	50	3	S	2		4317	2.46	4426
324 E	L2600W+ 600S	50	110	5	S	3		4834	0.93	4879
324 E	L2600W+ 600S	110	150	7	S	3		4426	0.78	4461
324 E	L2600W+ 600S	150	210	9	N S	5		4426	1.07	4474
324 E	L2600W+ 600S	210	270	11	N S	7		5234	1.73	5326
324 E	L2600W+ 600S	270	330	13	N S	6		5148	0.99	5199
324 E	L2600W+ 600S	330	380	15	N S C	5		5512	6.26	5880
324 E	L2600W+ 600S	380	420	17	N C S	6		5181	10.46	5786
324 W	L3400W+ 900S	0	30	1	N S	1		4245	2.7	4363
324 W	L3400W+ 900S	30	50	3	S	4		4637	1.0	4684
324 W	L3400W+ 900S	50	110	5	S	3		4698	0.75	4734
324 W	L3400W+ 900S	110	170	7	N S	3		4673	0.4	4692
324 W	L3400W+ 900S	170	240	9	S	3		4687	0.74	4722
324 W	L3400W+ 900S	240	280	11	N S	4		4895	0.71	4930
324 W	L3400W+ 900S	280	340	13	N C S	6		5301	1.01	5355
324 W	L3400W+ 900S	340	400	15	N C S	6		5328	1.16	5391
324 W	L3400W+ 900S	400	480	17	N C S	7		5406	1.63	5496
324 W	L3400W+ 900S	480	560	19	N S	5		5604	4.64	5877
324 W	L5100W+ 800N	0	30	21	S	2		4309	0.90	4348
324 W	L5100W+ 800N	30	50	23	S	3		4587	0.73	4621
324 W	L5100W+ 800N	50	120	25	S	3		4742	0.58	4770
324 W	L5100W+ 800N	120	190	27	S	3		4673	0.63	4703
324 W	L5100W+ 800N	190	260	29	N S	3		4489	0.63	4517
324 W	L5100W+ 800N	260	330	31	N S	4		4503	0.83	4541
324 W	L5100W+ 800N	330	360	33	N S C	5		4773	0.74	4809
324 W	L5100W+ 800N	360	390	35	N S C	7		4412	8.66	4830
498	B2100N+	10	70	3	S	2		4175	1.0	4217
498	B2100N+	70	120	5	S	3		4151	0.5	4174

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
498	B2100N+	120	140	7	NS S	4		4561	0.4	4579
498	B2100N+	140	160	9	NSC S	4		4836	1.2	4895
498	B2100N+	160	220	11	N SCS	8		5248	3.1	5416
498	B2100N+	220	260	13	LS S	7		4798	5.9	5099
498	B2100N+	260	310	15	C BS	3		4731	4.1	4933
498	L1200N+ 300W	0	20	17	S	2		4045	2.1	4132
498	L1200N+ 300W	20	50	19	C SS	3		4367	2.1	4461
498	L1200N+ 300W	50	110	21	CL SS	5		4836	3.9	5032
498	L1200N+ 300W	110	160	23	L SS	6		4700	3.7	4881
498	L1200N+ 300W	160	210	25	LC SS	6		4653	12.0	5287
498	L1200N+ 300W	210	260	27	C SB	4		4311	7.2	4645
498	L1200N+ 300W	260	280	29	C B	6		4411	8.3	4810
4	B 800E+	0	20	1	S	2		4003	1.0	4043
4	B 800E+	20	70	3	N SS	3		4328	0.8	4363
4	B 800E+	70	110	5	SS	3		4392	1.5	4459
4	B 800E+	110	210	7	N C SS	5		5050	2.8	5195
4	B 800E+	210	300	9	N C SS	8		3600	31.2	5233
4	B2800E+	50	120	11	SS	3		4325	0.3	4338
4	B2800E+	120	180	13	SS	3		4361	0.4	4379
4	B2800E+	180	240	15	N SS	5		4864	0.5	4888
4	B2800E+	240	280	17	N SS	6		5031	1.2	5092
4	B2800E+	280	340	19	SS	4		4714	0.6	4742
4	B2800E+	340	370	21	SS	3		4128	0.7	4157
4	B2800E+	370	430	23	NS SS	7		5017	1.4	5088
4	B2800E+	430	510	25	N SS CC	7		4867	3.8	5059
4	B2800E+	510	570	27	CC	7		5203	3.8	5409
4	B2800E+	550	590	29	SB CC	3		4434	3.1	4576
10	L 500S+ 200W	0	20	1	SS	1		3492	1.4	3542
10	L 500S+ 200W	20	50	3	SS	2		4003	1.2	4052
10	L 500S+ 200W	50	130	5	S SS	8		5403	2.0	5513
10	L 500S+ 200W	130	190	7	S SS	8		5475	0.9	5525
10	L 500S+ 200W	190	250	9	S SS	5		5356	2.3	5482
10	L 500S+ 200W	250	300	11	N SN SS	4		5287	4.9	5559
10	L 900S+ 600E	0	20	13	N SS	2		4517	0.9	4558
10	L 900S+ 600E	20	40	15	N SS	3		4650	0.6	4678
10	L 900S+ 600E	40	60	17	SS	6		4842	0.7	4876
10	L 900S+ 600E	60	100	19	SS	3		3975	0.4	3991
10	L 900S+ 600E	100	160	21	N SS	4		4745	0.7	4778
10	L 900S+ 600E	160	220	23	N SS	5		4525	0.8	4561
10	L 900S+ 600E	220	260	25	N SS CC	4		4928	2.8	5070
10	L 900S+ 600E	260	340	27	N S CC	6		5392	9.3	5945
305	L2300E+ 200S	0	20	1	SS	2		3970	0.4	3986
305	L2300E+ 200S	20	50	3	SS	3		4359	1.3	4416
305	L2300E+ 200S	50	140	5	SS	3		4475	0.2	4484
305	L2300E+ 200S	140	200	7	S	7		5039	0.7	5075

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
305	L2300E+ 200S	200	300	9	L S	4		4795	0.9	4839
305	L2300E+ 200S	300	340	11	N C S	7		5573	4.4	5829
305	L2300E+ 200S	340	400	13	N S C	4		4192	3.5	4344
305	L2300E+ 200S	400	440	15	C	8		3889	33.2	5822
324 N	L 700N+ 400E	0	20	1	N S	3		3409	1.1	3447
324 N N	L 700N+ 400E	20	50	3	N S	5		4217	1.1	4264
324 N N	L 700N+ 400E	50	110	5	S	6		4261	0.5	4282
324 N N	L 700N+ 400E	110	190	7	S	6		4292	0.6	4318
324 N N	L 700N+ 400E	190	230	9	N S	7		4800	0.6	4829
324 N N	L 700N+ 400E	230	280	11	N S	4		4509	0.9	4550
324 N N	L 700N+ 400E	280	320	13	N S	4		4659	0.9	4701
324 N N	L 700N+ 400E	320	370	15	N S C	5		5648	3.1	5829
324 N N	L2600N+ 300E	0	20	17	S	2		5025	1.7	5112
324 N N	L2600N+ 300E	20	50	19	S	3		4028	1.0	4069
324 N N	L2600N+ 300E	50	120	21	S	3		4120	0.4	4137
324 N N	L2600N+ 300E	120	180	23	N S	6		4486	1.1	4536
324 N N	L2600N+ 300E	180	250	25	N S	6		4445	0.8	4481
324 N N	L2600N+ 300E	250	340	27	S	4		4295	0.7	4325
324 N N	L2600N+ 300E	340	410	29	N S	5		4370	1.1	4419
324 N N	L2600N+ 300E	410	450	31	N C S	8		4799	1.6	4867
324 N	L2600N+ 300E	450	480	33	C S	8		5259	2.9	5416
496	L 600N+ 100E	0	20	1	S	2		4053	1.2	4102
496	L 600N+ 100E	20	50	3	S	3		4103	0.6	4128
496	L 600N+ 100E	50	120	5	S	3		3834	0.5	3853
496	L 600N+ 100E	120	160	7	S	3		4164	1.0	4206
496	L 600N+ 100E	160	210	9	N S C	4		4553	3.6	4723
496	L 600N+ 100E	210	250	11	L S C	8		5034	14.4	5881
496	L 600N+ 100E	250	280	13	S C	4		5034	7.3	5430
496	L 600N+ 100E	280	310	15	C B	3		3531	4.6	3701
497	B1200E+	0	20	1	S	2		3981	1.3	4033
497	B1200E+	20	50	3	S	3		4356	0.8	4391
497	B1200E+	50	130	5	S	3		4014	0.5	4034
497	B1200E+	130	170	7	S	8		5092	6.0	5417
497	B1200E+	170	250	9	C B	3		4611	1.5	4681
497	B1200E+	250	310	11	C B	4		4784	2.4	4902
502	B 500N+	0	20	1	S	2		3914	4.9	4116
502	B 500N+	20	50	3	C S	5		4761	2.8	4898
502	B 500N+	50	100	5	C S	7		5050	2.3	5169
502	B 500N+	100	150	7	C S	7		5180	4.0	5396
502	B 500N+	150	200	9	C S	9		2947	48.7	5745
502 A	B 600S+	0	20	1	N C S	2		3522	3.4	3646
502 A A	B 600S+	20	50	3	N C S	3		4410	2.9	4542
502 A A	B 600S+	50	100	5	N S C	4		4642	2.1	4742
502 A A	B 600S+	100	160	7	N S C	4		4856	1.9	4950
502 A	B 600S+	160	220	9	L S C	8		5070	6.5	5422

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502 A	B 600S+	220	250	11	N C	7		4667	4.4	4882
503	L1200N+ 700E	0	20	1		2		3550	0.9	3582
503	L1200N+ 700E	20	50	3	S S	3		4603	0.4	4621
503	L1200N+ 700E	50	150	5	S S	3		4570	0.4	4588
503	L1200N+ 700E	150	200	7	N S	4		4748	0.5	4772
503	L1200N+ 700E	200	240	9	S S	8		4992	0.9	5037
503	L1200N+ 700E	240	310	11	S S	4		4598	0.9	4640
503	L1200N+ 700E	310	340	13	N S	7		5062	2.4	5186
503	L1200N+ 700E	340	400	15	N S C	4		4900	0.8	4940
507	L1000E+ 100S	0	10	1	S S	1		4125	0.8	4158
507	L1000E+ 100S	10	30	3	S S	3		4175	0.2	4183
507	L1000E+ 100S	30	50	5	S S	3		4136	0.2	4144
507	L1000E+ 100S	50	70	7	S S	3		3692	0.7	3718
507	L1000E+ 100S	70	100	9	S S	3		3967	0.1	3971
507	L1000E+ 100S	100	150	11	C S S	7		4486	0.6	4513
507	L1000E+ 100S	150	190	13	N C S	8		4825	0.8	4864
507	L1000E+ 100S	190	230	15	N C S	8		3845	1.9	3919
507	L1000E+ 100S	230	250	17	N C S	9		3545	30.9	5130
507	B1000E+	0	20	19	N N S	3		4128	1.2	4178
507	B1000E+	20	50	21	N N S	3		4153	0.6	4178
507	B1000E+	50	80	23	S S	3		4164	0.8	4198
507	B1000E+	80	120	25	N S	3		4264	0.4	4281
507	B1000E+	120	140	27	N N S	4		4078	0.3	4090
507	B1000E+	140	230	29	N N S	4		4295	1.3	4352
507	B1000E+	230	300	31	N N S	6		4503	1.2	4558
507	B1000E+	300	360	33	N C S	6		4489	1.3	4548
507	B1000E+	360	400	35	N C S	6		4756	1.2	4814
507	B1000E+	400	430	37	N C S	8		4909	3.0	5061
507	B1000E+	430	450	39	N C	6		4856	3.4	5027
532	B2900E+	0	10	1	S S	1		3892	2.4	3988
532	B2900E+	10	70	3	S S	2		4103	2.4	4204
532	B2900E+	70	160	5	S S	3		4350	0.8	4385
532	B2900E+	160	210	7	S S	7		4703	1.1	4755
532	B2900E+	210	270	9	S S	5		3906	0.7	3934
532	B2900E+	270	330	11	S S	5		4317	1.0	4361
532	B2900E+	330	370	13	S S	5		4420	1.2	4474
532	B2900E+	370	420	15	S S	8		4478	1.3	4537
532	B2900E+	420	470	17	N S C	8		3306	44.1	5914
568	B1700N+	10	50	3	S S	3		4064	1.1	4109
568	B1700N+	50	140	5	S S	3		4331	0.7	4362
568	B1700N+	140	250	7	S S	3		4236	0.7	4266
568	B1700N+	250	300	9	S S	4		4500	1.0	4545
568	B1700N+	300	350	11	S C	7		4470	1.4	4533
568	B1700N+	350	410	13	N S	6		4458	0.9	4498
568	B1700N+	410	520	15	N S	5		4525	1.8	4608

BOG NUMBER	SITE NUMBER	DEPTH (CM) FROM	TO	SAMPLE NUMBER	PEAT TYPE	H	DRY DENSITY	GCV CAL/G	ASH %	AFCV CAL/G
568	B1700N+	520	560	17	S	4		4461	2.5	4575
568	B1700N+	560	620	19	SC	6		4884	3.7	5072
524	L2500E+1300N	0	20	532	LSS	6		5269	5.23	5560
524	L2500E+1300N	20	50	534	LS	6		5209	5.04	5485
524	L2500E+1300N	50	130	538				5131	7.77	5563
524	L2500E+1300N	130	190	540				4621	16.88	5559
525	L2100N+ 200W	0	50	578	S	3		4398	1.11	4447
525	L2100N+ 200W	50	180	582				4555	1.00	4601
525	L2100N+ 200W	180	330	588				4534	1.00	4580
525	L2100N+ 200W	330	380	590	LS	8		5077	2.90	5229
525	L2100N+ 200W	380	440	592				3985	20.98	5043
527	L2300W+ 800S	0	40	190	NS			4415	1.98	4504
529	L2300W+ 800S	40	210	193	S			4997	0.89	5042
527	L2300W+ 800S	210	240	195				5230	2.99	5391
531	B 500W+	0	50	484	NS	3		4867	1.37	4935
531	B 500W+	50	110	486	ERS	9		5653	2.52	5799
536	L 900N+ 400E	0	40	318	S	3		5130	1.43	5204
536	L 900N+ 400E	40	170	324	S	3		4632	0.76	4667
536	L 900N+ 400E	170	230	326	NS	3		4770	0.87	4812
536	L 900N+ 400E	230	320	328				5037	1.77	5128
536	L 900N+ 400E	320	380	330				5031	3.98	5240
541	B 900W+	0	30	496	S	4		4923	1.21	4983
541	B 900W+	30	50	498	S	7		4970	1.18	5029
541	B 900W+	50	160	500	S			4474	0.98	4518
541	B 900W+	160	230	504				4591	1.71	4671
541	B 900W+	230	300	506	LS	7		4998	4.80	5250
549	L 900N+ 100W	0	50	291	SS	2		4445	1.90	4531
549	L 900N+ 100W	50	170	293	NS	3		4622	0.74	4656
549	L 900N+ 100W	170	320	297				4960	0.94	5007
549	L 900N+ 100W	320	460	301				4588	0.93	4631
549	L 900N+ 100W	460	560	305				4619	10.88	5183
550	B1200W+	0	20	649	NS	6		4910	1.35	4977
550	B1200W+	20	50	650	NNS	6		4862	1.06	4914
550	B1200W+	50	120	652	NNS	5		4625	0.80	4662
550	B1200W+	120	180	654	NNS	4		4469	1.00	4514
550	B1200W+	180	230	656	NS	7		5063	1.71	5151
550	B1200W+	230	320	658				4126	25.47	5536
551	L 600N+ 300W	0	120	433	S	4		5096	1.10	5153
551	L 600N+ 300W	120	180	437	NS	5		5302	0.82	5346
551	L 600N+ 300W	180	290	443	NS	7		4720	1.34	4784
551	L 600N+ 300W	290	430	445				4972	6.04	5292
551	L1600N+ 200E	0	30	470	NS	6		4942	1.65	5025
551	L1600N+ 200E	30	50	472	NNS	6		4964	2.29	5080
551	L1600N+ 200E	50	150	474	NS	7		4853	2.60	4983
551	L1600N+ 200E	150	250	478				4735	5.44	5007

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551	L1600N+ 200E	250	330	480		4		4450	13.05	5118
552	B1700N+	0	40	411	S	3		4409	0.89	4449
552	B1700N+	40	170	415	S	3		4443	0.63	4471
552	B1700N+	170	250	419	N S	5		4765	0.73	4800
552	B1700N+	250	370	423	N S	5		4790	1.09	4843
552	B1700N+	370	510	427				4977	2.87	5124
552	L1100E+ 800N	0	50	401	S	2		4264	1.30	4320
552	L1100E+ 800N	50	150	405				5231	1.89	5332
552	L1100E+ 800N	150	220	409				5216	9.54	5766
561	L1600E+ 200N	0	120	14	N S	5		4843	1.43	4913
561	L1600E+ 200N	120	270	16				4691	0.79	4728
561	L1600E+ 200N	270	390	19	N S	6		4843	1.58	4921
561	L1600E+ 200N	390	460	20	N S C	7		5175	4.58	5423
562	L2680W+ 300N	50	140	37				4807	1.28	4869
562	L2680W+ 300N	140	260	39	L S	8		5133	6.16	5470
563	B1100E+	0	50	362	S	4		4552	3.49	4717
563	B1100E+	50	120	366	N C S	4		4754	5.33	5022
563	B1100E+	120	210	368	L C S	4		4532	13.12	5216
563	B1100E+	210	270	453	L C S	7		4360	15.92	5186
565 A	L 400N+ 100E	0	30	370	S	8		4913	1.02	4964
565 A	L 400N+ 100E	30	50	372	S	8		4951	1.20	5011
565 A	L 400N+ 100E	50	160	374	S	5		4789	0.81	4828
565 A	L 400N+ 100E	160	290	378	S	4		4876	2.07	4979
565 A	L 400N+ 100E	290	410	382	N C S	6		5012	2.83	5158
565 A	L 400N+ 100E	410	460	386	S C	6		5062	6.68	5424
569	B 400N+	0	50	714	S	3		4374	1.52	4442
569	B 400N+	50	90	718	S	3		4486	1.34	4547
569	B 400N+	90	140	720	N S	5		4532	1.28	4591
569	B 400N+	140	260	724				4600	1.66	4678
569	B 400N+	260	340	726				4858	4.02	5061
581	B1600N+	0	120	844	N S	4		4721	1.52	4794
581	B1600N+	120	250	850	N S	4		4721	1.19	4778
581	B1600N+	250	360	854	N S			4873	1.62	4953
581	B1600N+	360	510	858		7		4698	13.77	5448
581	L 300N+ 700W	0	40	728	S			4139	1.10	4185
581	L 300N+ 700W	40	170	732	S			4396	1.40	4462
581	L 300N+ 700W	170	300	736	N S			4737	1.74	4821
581	L 300N+ 700W	300	400	740	L S			4461	11.88	5062
582	L 600N+ 700W	0	110	746	S	3		4979	1.10	5034
582	L 600N+ 700W	110	280	750	S	4		4466	0.99	4511
582	L 600N+ 700W	280	430	758				4614	1.18	4669
582	L 600N+ 700W	430	560	760	N S	6		4718	1.90	4809
582	L 600N+ 700W	560	630	764	N C S	7		4824	3.69	5009
582	L1500N+ 300W	0	50	780	S	3		4520	1.37	4583
582	L1500N+ 300W	50	110	784	N S	6		4710	1.16	4765

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582	L1500N+ 300W	110	240	786	N S			4606	0.98	4652
582	L1500N+ 300W	240	310	790	N S	4		4786	1.34	4851
582	L1500N+ 300W	310	380	792				4972	1.89	5068
582	L1500N+ 300W	380	450	794	N C S	8		4882	4.50	5112
582	H1800S+	0	50	806	S	6		4815	1.76	4901
582	H1800S+	50	260	810				4733	1.12	4787
582	H1800S+	260	360	816	N S			4996	1.05	5049
582	H1800S+	360	500	820				5100	2.95	5255
591	L1000N+ 300E	0	80	64	S	2		4420	1.45	4485
591	L1000N+ 300E	80	140	66	S	2		4649	1.49	4719
591	L1000N+ 300E	140	250	68	S	3		4834	1.45	4905
591	L1000N+ 300E	250	320	70	S	8		4920	0.99	4969
591	L1000N+ 300E	320	420	71	N S			4846	1.48	4918
591	L1000N+ 300E	420	470	73				4986	8.30	5437
592	B 700N+	0	50	130	S			4284	1.83	4364
592	B 700N+	50	160	132	N S	3		4603	1.26	4662
592	B 700N+	160	300	134	N S	3		4525	1.09	4575
592	B 700N+	300	460	136	N S	3		4680	1.93	4772
592	B 700N+	460	520	138	N S	3		4701	1.12	4754
592	B 700N+	520	660	140				4838	1.80	4927
592	B 700N+	660	720	141	S C	8		4736	2.35	4850
592	B 700N+	720	790	142	N S C	8		5081	3.40	5260
597	B 500N+	0	50	334				4666	1.69	4746
597	B 500N+	50	120	338	N S	6		5059	2.41	5184
597	B 500N+	120	230	340	S	4		4805	0.77	4842
597	B 500N+	230	280	344	L S	9		5106	2.03	5212
597	B 500N+	280	380	348	L S	9		4805	6.95	5164
598	B2400W+	0	40	255	S	5		4515	1.69	4593
598	B2400W+	40	170	261	S	4		4620	0.86	4660
598	B2400W+	170	220	263	N S			5253	2.14	5368
598	B2400W+	220	340	265				5276	3.36	5459
599	B 300S+	0	50	227	S	1		4538	1.75	4619
599	B 300S+	50	160	231	S	4		4751	1.05	4801
599	B 300S+	160	260	235				4956	1.70	5042
599	B 300S+	260	320	239	N S			5115	2.46	5244
600	B 200E+	0	120	105	S	2		4788	1.64	4868
600	B 200E+	120	190	106	S	9		4810	2.80	4949

APPENDIX II

Tables of Gross Calorific Value
Grouped by Degree of Humification

Humification	No. of Samples	Mean (cal/g)	Standard Deviation	Range Minimum		Range Maximum
1	31	4298.0	275.6	3492	to	4839
2	70	4411.4	308.4	3522	to	5025
3	146	4575.7	321.9	3409	to	5191
4	196	4961.0	373.4	3359	to	5938
5	107	5004.9	467.4	2072	to	5789
6	114	4999.6	379.9	3848	to	5800
7	105	5133.2	438.6	3134	to	5817
8	53	4852.8	825.3	2306	to	6223
9	10	3828.7	1165.6	2161	to	5653
All Cases With Value For H	832	4834.6	512.5	2072	to	6223

Linear Regression Equation With H As X Variable: $Y = 84.333X + 4442.6$

Coefficient of Correlation (r): $r = .3112$

Table II-1 Gross calorific value grouped by degree of humification for all samples.

Humification	No. of Samples	Mean (cal/g)	Standard Deviation	Range Minimum		Maximum
1	31	4298.0	275.6	3492	to	4839
2	70	4411.4	308.4	3522	to	5025
3	146	4575.7	321.9	3409	to	5191
4	193	4967.4	366.8	3359	to	5938
5	105	5043.8	354.3	3906	to	5789
6	110	5016.1	366.0	3848	to	5800
7	100	5165.1	390.9	3545	to	5817
8	39	5229.4	461.5	3845	to	6223
9	4	5093.5	398.7	4805	to	5653
All Cases With Value For H	798	4875.9	447.9	3359	to	6223

Linear Regression Equation With H As X Variable: $Y = 134.80X + 4264.7$

Coefficient of Correlation (r): $r = .5491$

Table II-2 Gross calorific value grouped by degree of humification for samples with less than 15 percent ash.

Humification	No. of Samples	Mean (cal/g)	Standard Deviation	Range		
				Minimum		Maximum
1	30	4279.9	261.1	3492	to	4661
2	70	4411.4	308.4	3522	to	5025
3	136	4565.7	308.6	3409	to	5191
4	102	4852.9	314.9	3884	to	5839
5	67	4936.0	332.8	3906	to	5525
6	77	4986.6	349.1	3848	to	5746
7	72	5164.7	395.4	3545	to	5817
8	26	5177.5	518.9	3845	to	6223
9	4	5093.5	398.7	4805	to	5653
All Cases With Value For H	584	4785.3	434.7	3409	to	6223

Linear Regression Equation With H As X Variable	Y = 137.82X + 4187.5
Coefficient of Correlation (r)	r = .6104

Table II-3 Gross calorific value grouped by degree of humification for sphagnum peat samples with less than 15 percent ash.

Humification	No. of Samples	Mean (cal/g)	Standard Deviation	Range		
				Minimum		Maximum
1	1	4839.0	-	-		-
2	-	-	-	-		-
3	7	4892.9	234.7	4434	to	5135
4	88	5115.6	368.6	3359	to	5938
5	38	5233.9	311.5	4565	to	5789
6	32	5106.0	388.5	3934	to	5800
7	27	5183.6	382.3	4412	to	5738
8	13	5333.4	309.7	4736	to	5781
9	-	-	-	-		-
All Cases With Value For H	206	5149.7	361.8	3359	to	5938

Linear Regression Equation With H As X Variable: $Y = 39.883X + 4946.4$

Coefficient of Correlation (r): $r = .1515$

Table II-4 Gross calorific value grouped by degree of humification for sedge peat samples with less than 15 percent ash.

APPENDIX III

Tables of Ash-free Calorific Value

Grouped by Degree of Humification

Humification	No. of Samples	Mean (cal/g)	Standard Deviation	Range Minimum		Maximum
1	31	4389.6	334.7	3542	to	5488
2	70	4480.2	319.6	3582	to	5185
3	146	4648.7	347.2	3447	to	5705
4	196	5121.0	420.5	3551	to	6403
5	107	5184.2	489.2	2521	to	5907
6	114	5223.3	446.1	3898	to	7125
7	105	5387.7	445.9	3667	to	6928
8	53	5437.5	674.6	3241	to	7356
9	10	5599.9	576.2	4949	to	6889
All Cases With Value For H	832	5038.7	544.6	2521	to	7356

Linear Regression Equation With H As X Variable: $Y = 160.21X + 4294.5$

Coefficient of Correlation (r): $r = .5562$

Table III-1 Ash-free calorific value grouped by degree of humification for all samples.

Humification	No. of Samples	Mean (cal/g)	Standard Deviation	Range Minimum		Maximum
1	31	4389.6	334.7	3542	to	5488
2	70	4480.2	319.6	3582	to	5185
3	146	4648.7	347.2	3447	to	5705
4	193	5107.9	403.5	3551	to	6244
5	105	5205.9	417.0	3934	to	5907
6	110	5197.0	411.0	3898	to	6088
7	100	5354.4	396.1	3667	to	5993
8	39	5450.3	552.2	3919	to	6562
9	4	5281.0	363.8	4949	to	5799
All Cases With Value For H	798	5014.6	505.0	3447	to	6562

Linear Regression Equation With H As X Variable: Y = 159.14X + 4293.2

Coefficient of Correlation (r): r = .5749

Table III-2 Ash-free calorific value grouped by degree of humification for samples with less than 15 percent ash.

Humification	No. of Samples	Mean (cal/g)	Standard Deviation	Range Minimum		Maximum
1	30	4352.9	270.0	3542	to	4757
2	70	4480.2	319.6	3582	to	5185
3	136	4627.2	321.3	3447	to	5243
4	102	4934.5	336.6	3907	to	5845
5	67	5029.6	371.4	3934	to	5638
6	77	5102.0	376.1	3898	to	6088
7	72	5296.7	397.4	3667	to	5993
8	26	5329.2	573.5	3919	to	6562
9	4	5281.0	363.8	4949	to	5799
All Cases With Value For H	584	4876.2	465.7	3447	to	6562

Linear Regression Equation With H As *Y* Variable: $Y = 151.62X + 4218.6$

Coefficient of Correlation (r): $r = .6269$

Table III-3 Ash-free calorific value grouped by degree of humification for sphagnum peat samples with less than 15 percent ash.

Humification	No. of Samples	Mean (cal/g)	Standard Deviation	Range Minimum		Maximum
1	1	5488.0	-	-		-
2	-	-	-	-		-
3	7	5156.4	339.3	4576	to	5705
4	88	5316.3	381.7	3551	to	6244
5	38	5516.8	295.0	4755	to	5907
6	32	5437.7	400.4	4372	to	6001
7	27	5504.9	364.9	4533	to	5916
8	13	5692.5	430.1	4850	to	6528
9	-	-	-	-		-
All Cases With Value For H	206	5416.0	383.8	3551	to	6528

Linear Regression Equation With H As X Variable: $Y = 73.355X + 5042.3$

Coefficient of Correlation (r): $r = .2627$

Table III-4 Ash-free calorific value grouped by degree of humification for sedge peat samples with less than 15 percent ash.

APPENDIX IV

Tables of Ash Content Grouped by Degree of Humification

Humification	No. of Samples	Mean (%)	Standard Deviation	Range		
				Minimum		Maximum
1	31	1.99	1.98	0.4	to	11.8
2	70	1.52	0.97	0.3	to	4.9
3	146	1.52	1.98	0.1	to	14.3
4	196	3.00	3.62	0.1	to	33.2
5	107	3.40	3.98	0.5	to	30.8
6	114	4.08	4.89	0.1	to	25.6
7	105	4.55	6.07	0.1	to	39.6
8	53	10.55	12.32	0.8	to	44.1
9	10	29.98	24.58	2.0	to	68.6
All Cases With Value For H	832	3.78	6.54	0.1	to	68.6

Linear Regression Equation With H As X Variable: $Y = 1.2897X + 2.2049$

Coefficient of Correlation (r): $r = .3726$

Table IV-1 Ash contents (percent of dry weight) grouped by degree of humification for all samples.

Humification	No. of Samples	Mean (%)	Standard Deviation	Range		
				Minimum		Maximum
1	31	1.99	1.98	0.4	to	11.8
2	70	1.52	0.97	0.3	to	4.9
3	146	1.52	1.98	0.1	to	14.3
4	193	2.68	2.44	0.1	to	13.2
5	105	3.01	2.60	0.5	to	12.1
6	110	3.38	3.2[illegible]	0.1	to	13.3
7	100	3.49	3.43	0.1	to	14.6
8	39	3.88	3.25	0.8	to	14.4
9	4	3.58	2.27	2.0	to	7.0
All Cases With Value For H	798	2.64	2.70	0.1	to	14.6

Linear Regression Equation With H As X Variable: $Y = .39463X + .85639$

Coefficient of Correlation (r): $r = .2664$

Table IV-2 Ash contents (percent of dry weight) grouped by degree of humification for samples with less than 15 percent ash.

Humification	No. of Samples	Mean (%)	Standard Deviation	Range		
				Minimum		Maximum
1	30	1.67	0.78	0.4	to	4.5
2	70	1.52	0.97	0.3	to	4.9
3	136	1.30	1.62	0.1	to	13.3
4	102	1.61	1.92	0.1	to	13.1
5	67	1.81	1.53	0.5	to	7.0
6	77	2.21	2.29	0.1	to	12.0
7	72	2.48	2.26	0.1	to	12.2
8	26	2.76	1.87	0.8	to	6.6
9	4	3.58	2.27	2.0	to	7.0
All Cases With Value For H	584	1.81	1.83	0.1	to	13.3

Linear Regression Equation With H As X Variable: $Y = .21469X + .87421$

Coefficient of Correlation (r): $r = .2258$

Table IV-3 Ash content grouped by degree of humification for sphagnum peat samples with less than 15 percent ash.

Humification	No. of Samples	Mean (%)	Standard Deviation	Range Minimum		Maximum
1	1	11.80	-	-		-
2	-	-	-	-		-
3	7	4.94	4.25	1.3	to	14.3
4	88	3.76	2.21	0.1	to	13.2
5	38	5.12	2.75	0.7	to	12.1
6	32	6.06	3.55	0.9	to	13.3
7	27	5.78	4.32	0.9	to	14.6
8	13	6.12	4.25	0.9	to	14.4
9	-	-	-	-		-
All Cases With Value For H	206	4.86	3.24	0.1	to	14.6

Linear Regression Equation With H As X Variable	Y = .53026X + 2.1579
Coefficient of Correlation (r)	r = .2249

Table IV-4 Ash content grouped by degree of humification for sedge peat samples with less than 15 percent ash.

APPENDIX V

A Discussion of Peat Decomposition

The process of photosynthesis converts energy from the sun into living plant matter that represents stored energy in the ecosystem. When the plant dies it becomes available to the decomposer food chain. In most ecosystems, breakdown of the plant matter is achieved by decomposer organisms and the stored energy is released by respiration. However, the high moisture content of the peatland ecosystem restricts this decomposition process. This permits dead plant matter to accumulate. The energy stored in this manner remains "locked" in this ecosystem until such time as conditions are modified to provide an environment conducive to decomposition. Under favourable geological conditions, this energy can be stored for many millions of years. This stored (or "fossil") energy can be released by combustion and as such makes a considerable contribution to the current energy utilization by man.

The storage of energy in a peatland environment will vary in relation to a number of characteristics of the ecosystem. Part of this variability can be related to the amount of energy "captured" by the living vegetation during primary production. In a minerotrophic peatland, the vegetation receives its nutrient supply from groundwater. The species present will vary somewhat according to environment and region and thus primary production is somewhat dependant on the species composition. However, the net production is regarded as high. This situation is in

sharp contrast to that found in an ombrotrophic peatland where the supply of nutrients is from precipitation. Again, primary production can be expected to be a function of the species present, but the overall primary production is considered to be low. These comparisons assume a climatic equivalence and it is worthy of note that primary production will also differ substantially within equivalent ecosystems that are located in different climatic zones.

The rate of primary production is an important factor in determining the amount of energy available for storage in a peatland ecosystem, but it is the amount of decomposition which occurs following the death of the plants which determines the quantity stored for long time periods (i.e. time in the geological sense). In other words, the amount of peat (and energy) which accumulates is the result of the rate of decomposition being lower than the rate of deposition of dead plant material. The rate of decomposition in peatland ecosystems is considered low and this can be related primarily to the high moisture content which inhibits microbial activity. The low pH, especially in ombrotrophic peatlands, may also limit microbial activity. However, variation in peatland type and environment can influence the moisture content regime and the pH and consequently some variation in rate of decomposition can be anticipated. For example, bogs (ombrotrophic peatlands) commonly have a perched water table and a pH of 3.5 to 4,

whereas swamps and marshes (minerotrophic peatlands) have higher pH (5 to 6) and water tables which fluctuate periodically. Fens display intermediate characteristics.

In addition to variation in rates of decomposition which relate to peatland type, there are stratigraphic zones within the peatland which exhibit different decomposition rates. As would be expected, the aerobic layer at the surface of the peatland displays the highest rate of decomposition. The thickness of this layer can be expected to fluctuate in relation to depth to water table (and hence peatland type). Clymo (1965) has shown the layer of highest decomposition is at the peatland surface. Decomposition losses become gradually lower down to a depth of about 20 cm. Below this depth, decomposition fluctuated around 2.5% dry weight loss. The study did not involve peat depths greater than 75 cm. Clymo also recognized a "sulphide zone" in which the production of sulphide by anaerobic decomposers of the genus Desulphovibrio reach a maximum at a depth of about 25 cm. Clymo's work indicates that, at least in a Sphagnum bog, the bulk of the decomposition occurs in the aerobic layer and that the rate of decomposition in the underlying anaerobic sulphide zone is approximately one-fifth that of the aerobic surface zone. The activity of anaerobic decomposers such as Desulphovibrio and other specialized microbes is assumed to decrease with depth in the peat layer.

Once the dead plant material has been buried to a sufficient depth that it is below the sulphide zone and in a fairly steady state with regard to decomposition, it becomes stored in the peat deposit. Similarly, the energy which is contained in the peat is also stored.

In the assessment of peat deposits for energy (and other) utilizations, samples are commonly collected and identified according to their botanical origin and their degree of decomposition. Numerous field and laboratory methods have been developed to measure the state of decomposition. These methods commonly reflect the proportion of amorphorous material in the sample. They do not reflect, per se, the amount of solid material lost during decomposition. One of the best known and accepted field methods for measurement of state of decomposition is the von Post method. This method can be carried out rapidly and accurately in the field and rates the peat into 10 categories or "degrees of humification". This method is reproduced on the following page (from Henderson and Doiron, 1982). It has been selected for use in this study on the basis of general acceptance within the "peat community" as a detailed field evaluation method.

The physical and chemical properties of peat have been shown to vary in relation to environment of origin and botanical composition, as well as in relation to degree of decomposition. However, a few general statements can be made

Degree of Humification	Initial Water	Texture	Plant Remains	Squeeze Test	Remarks
H1	clear	rough	living plants	very spongy	living layer
H2	clear to slightly yellow	rough	entire structure	spongy - will spring back after pressure. Holds no shape	
H3	yellow, slightly turbid	rough	breaking into pieces, but pieces are intact	slightly spongy holds a fairly definite form of handprint	
H4	light brown, turbid	very slightly soapy	pieces breaking up into individual components, *e.g.* leaves, stems, etc.	not spongy - forms a distinct replica of handprint - no peat escapes fingers	"brass knuckles" (H3 is rounded, whereas H4 is sharp)
H5	brown - mixture of plant debris, amorphous material and water	slightly soapy	individual components disintegrating such that some amorphous material is present	a very small amount of peat escapes the fingers	
H6	dark brown solution	soapy	plant structures evident on close examination - nearly half of sample in an amorphous state	one third of sample escapes fingers	
H7	very small amount - very dark brown	somewhat pasty	vague structures	over half of material escapes the hand as a paste	
H8	little or none	pasty	only roots or fibres are distinguishable - homogeneous	over two-thirds escapes the hand	
H9	none	pudding-like	extremely few remains	almost all escapes the hand	
H10	none		no distinguishable remains	all escapes the hand	rare

Initial water - Performed by gently squeezing the sample and catching the water in a cupped hand (step 3 in procedure). This test is limited, in that botanical composition can strongly affect water colour, *e.g.* a small amount of charcoal can turn the water dark. H9 and H10 peats have no free water, not even a glistening between the fingers.
Texture - Performed by visual and tactile (running fingers along core) examination. This test is used primarily as an indicator of where a core sample should be divided.
Plant remains - Performed by visual examination of the sample (step 4 in procedure). The amount of distinguishable plant structure is used in conjunction with the squeeze test for the final determination of degree of decomposition.
Squeeze test - This is the most subjective test of the von Post method, and strict adherence to the following guidelines is required for consistent results:
- Before performing the final squeeze, all the water must be released, otherwise a higher humification value will result. This is done by gently squeezing and turning the sample in the hand until water stops dripping. The final squeeze is performed by taking the sample in one hand, curling the fingers around the sample (such that as few openings as possible are created) and applying firm, even pressure. The squeeze should be performed "soon" after the peat is sampled, because drying can result in a low humification value, whereas too much "kneading" of the sample will give a high humification value.

TABLE V-1. Some characteristics of the 10 degrees of humification in the von Post scale (from Henderson and Doiron, 1982).

regarding trends which relate to decomposition. For example, higher concentrations of bitumens, lignins, and humic acids can be expected in highly decomposed peats, whereas hemicelluloses, celluloses, and polysaccharides would be more frequent in peats of low decomposition. Thus, increased decomposition allows the release of oxygen and leaves a residue of material that is relatively richer in carbon. These concepts and related topics are reviewed by Fuchsman (1980).

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